EXHIBIT 26

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TQ DELTA, LLC, Plaintiff/Counterdefendant, v. 2WIRE, INC. Defendant/Counterclaimant.	Civil Action No. 13-1835-RGA **JURY TRIAL DEMANDED**

DEFENDANT 2WIRE, INC.'S INVALIDITY CONTENTIONS IN RESPONSE TO TQ DELTA'S JULY 2, 2018 FINAL INFRINGEMENT CONTENTIONS

Pursuant to the Court's April 11, 2018 Final Scheduling Order, defendant 2Wire, Inc. ("2Wire") provides the following invalidity contentions in response to TQ Delta's Final Claim Charts for Products that Contain Broadcom DSL Chips, served on July 2, 2018.[1]

I. PRELIMINARY STATEMENT

In its Final Claim Charts for Products that Contain Broadcom DSL Chips, served on July 2, 2018, TQ Delta identified, and 2Wire provides its invalidity contentions for, the following claims:

- Family 1: U.S. Patent No. 7,889,784 (the "'784 Patent") claims 1 and 2 (collectively, the "Family 1 Patent" and the "Asserted Family 1 Claims");
- Family 2: U.S. Patent No. 7,453,881 (the "'881 Patent") claims 17 and 18 (collectively, the "Family 2 Patent" and the "Asserted Family 2 Claims");

[1] TQ Delta identified the asserted claims for each of the patent families in its in its Final Claim Charts for Products that Contain Broadcom DSL Chips, served on July 2, 2018. We collectively refer to those asserted claims here as "TQ Delta Asserted Claims".

- Family 3: U.S. Patent No. 8,276,048 (the "'048 Patent") claim 1, U.S. Patent No. 7.385,381 (the "'381 Patent") claim 5, U.S. Patent No. 7,844,882 (the "'882 Patent") claim 13 and U.S. Patent No. 8,495,473 (the "'473 Patent") claim 19 (collectively, the "Family 3 Patents" and the "Asserted Family 3 Claims");
- Family 4: U.S. Patent No. 7292,627 (the "'627 Patent") claim 26, U.S. Patent No. 8,073,041 (the "'041 Patent") claim 14, and U.S. Patent No. 8,909,008 (the "'008 Patent") claim 14 (collectively, the "Family 4 Patents" and the "Asserted Family 4 Claims");
- Family 5: U.S. Patent No. 7,451,379 (the "'379 Patent") claims 11 and 16 and U.S. Patent No. 8,516,337 (the "'337 Patent") claims 10 and 16 (collectively, the "Family 5 Patents" and the "Asserted Family 5 Claims");
- Family 6: U.S. Patent No. 8,462,835 (the "'835 Patent") claims 8 and 10 (collectively, the "Asserted Family 6 Claims").

2Wire's invalidity contentions are responsive only to the contentions and charts provided on July 2, 2018 by TQ Delta in its Final Claim Charts for Products that Contain Broadcom DSL Chips. 2Wire does not waive, and explicitly reserves all rights to assert, any and all invalidity contentions and arguments (including but not limited to contentions and arguments disclosed herein) with regard to any other claims on infringement contentions that TQ Delta may be permitted to assert in this case or otherwise.

2Wire's search for, and analysis of, prior art is ongoing, and 2Wire continues to investigate the public use, sale, or offer for sale of products and systems that may anticipate or render obvious one or more of TQ Delta's Asserted Claims. 2Wire also continues to investigate and analyze TQ Delta's Asserted Claims and to develop new bases and grounds for invalidity.

2Wire reserves the right to supplement and/or amend its contentions once it has been afforded an opportunity to conduct discovery with regard to the invalidity of TQ Delta's Asserted Claims.

Moreover, the Court has not yet entered a claim construction order on Family 5 in this case. Accordingly, 2Wire thus reserves the right to modify, amend, or supplement its invalidity contentions as may be necessary or appropriate following the entry of a claim construction order on Family 5 in particular in this case.

Prior art not included here, whether known or unknown to 2Wire, may become relevant. In particular, 2Wire is currently unaware of the extent to which TQ Delta will contend that limitations of TQ Delta's Asserted Claims are not disclosed in the prior art identified by 2Wire. To the extent that such issues arise, 2Wire reserves the right to identify other prior art references that would disclose, teach, suggest, practice, or render obvious the allegedly missing limitations.

2Wire's invalidity claim charts (Exhibits A-1 through M-8) cite to particular teachings and disclosures of the prior art as applied to TQ Delta's Asserted Claims. 2Wire's citations are intended to generally disclose the grounds for its invalidity contentions – not to provide an exhaustive list of supporting evidence. Moreover, persons of ordinary skill in the art may view an item of prior art in the context of other publications, literature, products, and understanding. Thus, the cited portions are only examples, and 2Wire reserves the right to rely on uncited portions of the prior art references and on other publications and expert testimony as aids in understanding and interpreting the cited portions as additional evidence that the prior art discloses a claim limitation or the claimed invention as a whole or as evidence of the obviousness based on, among other things, contemporaneous development by others. 2Wire further reserves the right to rely on uncited portions of the prior art references, other publications, and testimony (including expert testimony) to establish bases for anticipation or

combinations of certain prior art references that render TQ Delta's Asserted Claims obvious. Additionally, citations to a particular figure in a reference include the caption and description of the figure and any text relating to the figure. Similarly, citations to particular text referring to a figure include the figure and caption as well.

These invalidity contentions are based on 2Wire's current understanding of TQ Delta's Asserted Claims, and TQ Delta's apparent interpretation of those claims, to the extent that can be divined from TQ Delta's Final Claim Charts for Products that Contain Broadcom DSL Chips, served on July 2, 2018. Thus, these invalidity contentions, including the attached charts, may reflect alternative positions as to claim construction and scope. By including prior art that would anticipate or render obvious TQ Delta's Asserted Claims based on TQ Delta's apparent constructions or on any other particular construction, 2Wire is neither adopting such constructions nor admitting their accuracy. Nothing herein should be construed as an admission that 2Wire agrees with TQ Delta's apparent interpretation of the scope of claim language. 2Wire reserves the right to challenge TQ Delta's implicit constructions as inconsistent with the Court's claim construction rulings, or on other grounds. Similarly, nothing herein shall be construed as an admission regarding the application of the asserted claims to any of 2Wire's accused products.

Because TQ Delta has now provided its final infringement contentions with respect to Broadcom products, TQ Delta should not be permitted to change or amend its contentions, and 2Wire reserves the right to object to any attempt by TQ Delta to change or amend its contentions. Should TQ Delta be permitted to further amend its infringement contentions, or to provide additional information on infringement and TQ Delta's apparent construction of the asserted

claims, 2Wire reserves the right to amend and supplement these invalidity contentions as appropriate.

Finally, 2Wire does not waive, and expressly reasserts here, the grounds for invalidity set out in its preliminary invalidity contentions served on September 24, 2015 and its supplemental invalidity contentions served on January 23, 2017.

II. INVALIDITY CONTENTIONS FOR PATENT FAMILY 1

A. Invalidity Under 35 U.S.C. § 101

TQ Delta's Asserted Family 1 Claims are invalid for failing to recite patentable subject matter under 35 U.S.C. § 101. Section 101 provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." Nonetheless, there are three recognized exceptions to Section 101: "laws of nature, physical phenomena, and abstract ideas." *Bilski v. Kappos*, 561 U.S. 593, 601 (2010) (*quoting Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)).

TQ Delta's Asserted Family 1 Claims are invalid for claiming no more than an abstract idea. In *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014), the Supreme Court set out a two-part test for determining whether a claim recites patent-eligible subject matter. First, the court must determine whether the claims at issue are directed toward laws of nature, natural phenomena, or abstract ideas. *Id.* at 2355. Second, if the claims are directed toward ineligible subject matter, the court must then consider the claim elements – both individually and as an ordered combination – to determine whether they add an "inventive concept." *Id.* Merely claiming a generic "computer" to implement an abstract idea is not sufficient to transform the computer into a patent-eligible invention. *Id.* at 2357-50.

Here, claims 1 and 2 of the '784 Patent claim nothing more than the abstract idea of

measuring diagnostic information and communicating it to a connected device. More specifically, the Asserted Claims claim the abstract idea of collecting diagnostic or test information regarding the status of remote DSL subscriber equipment. Collecting diagnostic information is a long standing engineering practice and is well known in many fields of engineering. The communication of such information is similarly long standing and well known. The claims are untethered to any specific implementation or environment.

Nor do the elements of the claims – whether individually or as a whole – evidence any "inventive concept." The concept of signal-to-noise ratio in communication channels was well known, as was the need to communicate that information. The claims recite only a conventional technological environment, such as a conventional transceiver, and conventional methods of communicating information, that were well-known at the time of the alleged invention. Moreover, the '784 Patent claims does not require the transceiver to do anything with the message, or the diagnostic or test information within the message. For example, the '784 Patent claims do not require processing the message, interpreting the information in the message, or taking any action based on the information in the message. Accordingly, claims 1 and 2 of the '784 Patent are invalid for failure to recite patentable subject matter.

Defendant hereby incorporates in its entirety the briefing on its Motion for Judgment on the Pleadings and all declarations in support (D.I. 250, 251, 259), in which 2Wire argued that the claims of the Family 1 patent, including the '784 Patent, were invalid for failure to recite patentable subject matter under 35 U.S.C. § 101. 2Wire's motion was denied in an order dated February 6, 2017 (D.I. 266). Defendant reserves the right to raise the issue of whether the '784 Patent recites patentable subject matter on summary judgment and/or at trial. By way of example, there may be issues of fact relating to whether elements of the asserted claims are well-

understood, routine and conventional to one of ordinary skill in the art. *See, e.g.*, *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368 (Fed. Cir. 2018) ("The question of whether a claim element or combination of elements is well-understood, routine and conventional to a skilled artisan in the relevant field is a question of fact."); *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1128 (Fed. Cir. 2018) ("While the ultimate determination of eligibility under § 101 is a question of law, like many legal questions, there can be subsidiary fact questions which must be resolved en route to the ultimate legal determination.").

B. Collateral Estoppel

TQ Delta is estopped from asserting claims 1 and 2 of the '784 Patent in view of decisions rendered by the Patent Trial and Appeal Board in IPR2016-01007 and other proceedings, and in view of positions taken by TQ Delta in that proceeding. In IPR2016-01007, the PTAB cancelled all challenged claims of U.S. Patent No. 8,432,956, including claim 9 of the '956 Patent, which is substantively identical to and contains the same limitations as claims 1 and 2 of the '784 Patent. The '956 Patent claims priority to the same provisional application as the '784 Patent. Here, the identical issue was previously adjudicated by the PTAB, the issue of invalidity of those claim elements was actually litigated, the previous determination was necessary to the PTAB's decision to cancel all claims, and TQ Delta was fully represented in the prior action at the PTAB. *See Jean Alexander Cosmetics, Inc. v. L'Oreal USA, Inc.*, 458 F.3d 244, 249 (3d Cir. 2006). TQ Delta is precluded from arguing that claims 1 and 2 of the '784 Patent are valid. *See, e.g.*, *MaxLinear, Inc. v. CF CRESPE LLC*, 880 F.3d 1373, 1376 (Fed. Cir. 2018) (holding that patent claims found invalid in prior IPRs were subject to collateral estoppel in subsequent PTAB proceedings).

C. Invalidity Under 35 U.S.C. § 102 and/or 35 U.S.C. § 103

Claims 1 and 2 of the '784 Patent are anticipated and/or rendered obvious by at least the following references:

- U.S. Patent No. 6,445,730 ("Greszczuk")
- U.S. Patent No. 6,631,120 ("Milbrandt")
- U.S. Patent No. 6,636,603 ("Milbrandt 603")
- U.S. Patent No. 6,606,719 ("Ryckebusch")
- U.S. Patent No. 6,434,119 ("Wiese")
- U.S. Patent No. 6,865,232 ("Isaksson")
- U.S. Patent No. 6,219,378 ("Wu")
- U.S. Patent No. 4,679,227 ("Hughes-Hartogs")
- U.S. Patent No. 6,788,705 ("Rango")
- ANSI T1.413-1998, "Network and Customer Installation Interfactes – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface"
- ITU-T Recommendation G.992.1, "Asymmetric Digital Subscriber Line (ADSL) Transceivers"
- The Telebit T2500 Reference Manual ("T2500")

The patents, publications, and references identified above qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g). The charts identified as Exhibits A-1 through A-16 demonstrate how TQ Delta's Asserted Family 1 Claims are anticipated and/or rendered obvious by the references above. Each chart identifies certain prior art to the '784 Patent and identifies at least one citation in the prior art reference where each claim element of the asserted claims is disclosed. Though the charts provide illustrative citations to where each claim element may be found in the prior art, the cited references may contain additional disclosures of each claim element as well, and 2Wire reserves the right to assert that any claim element is disclosed

in other portions of the cited references. In addition, 2Wire identifies, and incorporates here by reference, all prior art of record in the prosecution history of the '784 Patent (and all related patents and applications), and all prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports, or specifications), any of which may anticipate and/or render TQ Delta's Asserted Family 1 Claims obvious. Further, 2Wire identifies any TQ Delta patents that claim the same priority date as the '784 Patent and disclose the same subject matter and for which a terminal disclaimer was not filed during prosecution, under the doctrine of obviousness-type double patenting. Additional evidence regarding the features and elements of prior art references may be provided by witness testimony, or by additional documents and materials describing the prior art, that may be identified through the course of ongoing discovery and investigation.

To the extent that a reference above is found to be missing a limitation of TQ Delta's Asserted Claims, any one of the prior art references identified above may be combined with any one or more of the other references identified above and the following references, all of which qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g), to render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103:

- U.S. Patent No. 6,590,893 ("Hwang")
- U.S. Patent No. 6,366,644 ("Sisk")
- U.S. Patent No. 4,438,551 ("Baran")
- U.S. Patent No. 5,838,268 ("Frenkel")
- U.S. Patent No. 4,679,227 ("Hughes-Hartogs")
- U.S. Patent No. 6,606,719 ("Ryckebusch")
- U.S. Patent No. 6,219,378 ("Wu")

- ANSI T1.413-1995, "Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface"
- ANSI T1.413-1998, "Network and Customer Installation Interfactes – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface"
- Gilbert Held, Data Communications Networking Devices: Operation, Utilization and LAN and WAN Internetworking, 4th edition

Specific combinations that render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103 using these references are set forth in Exhibits A-1 through A-16. Defendant reserves the right to rely on the references listed above for motivation to combine, the state of the art and/or the background knowledge of one of ordinary skill in the art.

In addition, any of the foregoing anticipatory or secondary prior art references listed above may be combined with any of the prior art of record in the prosecution history of the '784 Patent (and all related patents and applications), or with any prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports or specifications), to render TQ Delta's Asserted Family 1 Claims obvious. Further, any of the foregoing anticipatory or secondary prior art listed above may be combined with one another to render TQ Delta's Asserted Family 1 Claims obvious.

Moreover, one of ordinary skill in the art would have been motivated to combine one or more of the prior art references identified above to arrive at the combination of elements recited in each of TQ Delta's Asserted Claims. The suggestion or motivation to modify or combine references for obviousness purposes is provided by the explicit and implicit teachings of the prior art identified by 2Wire, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved. As an initial matter, 2Wire notes that each prior art reference is in or relates to the same field, high-speed communications and DSL. In addition, it would have been obvious to try combining the prior art

references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. The combination of prior art references identified in these contentions would have been obvious because the combinations represent the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry and the desire to improve features and performance would motivate the addition of features to systems as they become available, become smaller, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results. For example, those in the DSL and high-speed telecommunications industry had long understood the need to avoid sending a technician to diagnose problems with a subscriber line. Those in the industry also understood the benefits of being able to obtain information about a subscriber line remotely, without the necessity of sending out a technician. The motivation to combine references is exemplary only, and should not be used to limit these disclosures. There would have been substantial motivation to combine the prior art references prior to the invention date, and 2Wire reserves the right to and intends to supplement the foregoing with expert and other testimony. More detailed bases for the motivation to combine specific references will be set forth in 2Wire's invalidity charts and expert report(s) on invalidity.

To the extent that TQ Delta raises any secondary considerations of non-obviousness, for

example, in its expert reports, 2Wire reserves the right to address any such considerations, including by taking discovery on those issues and supplementing and/or amending its invalidity contentions.

In addition, the asserted claims of the '784 Patent are invalid under the printed matter doctrine because certain limitations claim printed matter (i.e., content of information) that is not functionally or structurally related to the medium containing the printed matter. In the alternative, the asserted claims of the '784 Patent are invalid under the printed matter doctrine because certain limitations claim printed matter and are not entitled to patentable weight, without which the claims are anticipated or rendered obvious by the cited references.

2Wire does not presently have any disclosures under 35 U.S.C. § 102(f). 2Wire reserves the right to amend and supplement these § 102(f) contentions as further information and discovery are obtained including, in particular, with regard to the alleged conception and reduction-to-practice of the patents-in-suit.

D. Invalidity Under 35 U.S.C. § 112

2Wire lists below exemplary grounds upon which it contends TQ Delta's Asserted Family 1 Claims are invalid for failure to meet one or more requirements of 35 U.S.C. § 112. A more detailed basis for 2Wire's written description, enablement, and indefiniteness defenses will be set forth in 2Wire's expert report(s) on invalidity. 2Wire reserves the right to supplement and/or amend these contentions based on Section 112 in light of discovery on invalidity issues and on any other basis permitted by the Court or the applicable rules. Such supplementation and/or amendments may include, but are not limited to, invalidity contentions based on indefiniteness, lack of written description, and/or lack of enablement.

Invalidity Under 35 U.S.C. § 112 ¶ 1: TQ Delta's Asserted Family 1 Claims are invalid because the patent specification does not include sufficient description of the subject matter

claimed, and the manner and process of using it, in such full, clear, concise, and exact terms as to enable any person of ordinary skill in the art to which it pertains to make and use the allegedly claimed invention without undue experimentation. 2Wire further contends that the full scope of each asserted claim was not described with particularity in the specification to which priority is apparently sought, thereby setting forth insufficient detail to allow one of ordinary skill in the art to understand what is claimed and to recognize that the inventor(s) invented what is claimed. By way of example, and without limitation, at least the following elements are not enabled and/or fail to meet the written description requirement of Section 112:

- "wherein bits in the message are modulated onto DMT symbols using Quadrature Amplitude Modulation (QAM) with more than 1 bit per subchannel" ('784 Patent, claims 1 and 2)
- "wherein at least one data variable of the one or more data variables comprises an array representing Signal to Noise ratio per subchannel during Showtime information" ('784 Patent, claims 1 and 2)

TQ Delta's Asserted Family 1 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to meet the enablement and/or written description requirements of Section 112.

The accused products do not infringe TQ Delta's Asserted Family 1 Claims for at least the reasons set out in the non-infringement charts previously provided by 2Wire, 2Wire's Interrogatory Responses, and any supplements thereto. To the extent TQ Delta's Asserted Family 1 Claims may eventually be construed so broadly as to cover the accused products, such a construction would render TQ Delta's Asserted Family 1 Claims invalid for failure to meet the requirements of Section 112, paragraph 1.

Invalidity Under 35 U.S.C. § 112 ¶ 2: TQ Delta's Asserted Family 1 Claims are also invalid because they fail to particularly point out and distinctly claim the subject matter that the purported inventors claimed (i.e., the claims are indefinite). 2Wire contends that a person of ordinary skill in the art to which the purported invention pertains would not understand the scope of each asserted claim when read in light of the specification. By way of example, and without limitation, at least the following claim terms are indefinite under Section 112:

- "a transmitter portion capable of transmitting a message, wherein the message comprises one or more data variables that represent the test information . . . wherein at least one data variable of the one or more data variables comprises an array representing Signal to Noise ratio per subchannel during Showtime information" ('784 Patent, claim 1)
- "a receiver portion capable of receiving a message, wherein the message comprises one or more data variables that represent the test information . . . wherein at least one data variable of the one or more data variables comprises an array representing Signal to Noise ratio per subchannel during Showtime information" ('784 Patent, claim 2)
- "wherein bits in the message are modulated onto DMT symbols using Quadrature Amplitude Modulation (QAM) with more than 1 bit per subchannel" ('784 Patent, claims 1 and 2)

TQ Delta's Asserted Family 1 Claims (and all other claims in the asserted patent that include or depend from any claims that include any of the above limitations) are invalid because they fail to particularly point out and distinctly claim the subject matter that the applicants regarded as their invention.

Further, TQ Delta's Asserted Family 1 Claims are invalid under Section 112 because they purport to claim both an apparatus and a method of using the apparatus. *See IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed. Cir. 2005). To the extent that TQ Delta's Asserted Family 1 Claims do not invoke 35 U.S.C. § 112, ¶ 6 (pre-AIA), those claims are invalid for merely claiming the function of an apparatus. Thus, each asserted claim is invalid as indefinite under Section 112, paragraph 2.

III. INVALIDITY CONTENTIONS FOR PATENT FAMILY 2

A. Invalidity Under 35 U.S.C. § 101

TQ Delta's Asserted Family 2 Claims are invalid for failing to recite patentable subject matter under 35 U.S.C. § 101. Section 101 provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." Nonetheless, there are three recognized exceptions to Section 101: "laws of nature, physical phenomena, and abstract ideas." *Bilski v. Kappos*, 561 U.S. 593, 601 (2010) (*quoting Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)).

TQ Delta's Asserted Family 2 Claims are invalid for claiming no more than an abstract idea. In *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014), the Supreme Court set out a two-part test for determining whether a claim recites patent-eligible subject matter. First, the court must determine whether the claims at issue are directed toward laws of nature, natural phenomena, or abstract ideas. *Id.* at 2355. Second, if the claims are directed toward ineligible subject matter, the court must then consider the claim elements – both individually and as an ordered combination – to determine whether they add an "inventive concept." *Id.* Merely claiming a generic "computer" to implement an abstract idea is not sufficient to transform the computer into a patent-eligible invention. *Id.* at 2357-50.

Here, claims 17-18 of the '881 Patent recite nothing more than the abstract idea of reducing delay by, for example, speeding one connection up or slowing another connection down. More specifically, the referenced claims (and all claims of the Family 2 Patent) claim the abstract idea of reducing a difference in latency (arrival time) between information carried over two communication paths by either increasing the rate at which information is carried and processed over one path or decreasing the rate at which information is carried and processed over the other path. Increasing or decreasing the rate over which information is carried over a communication path, or increasing and decreasing the rate at which data is processed, are long standing engineering practices and are well known in many fields outside of engineering, such as sending messages by post or hand delivery, for delivery within a particular time frame or by a particular date. The claims are untethered to any specific implementation or environment, and the patents and specification do not limit the concept of reducing a difference in delay. Moreover, the claims' recitation of "a plurality of bonded transceivers" does not provide sufficient structure to render these claims non-abstract.

Nor do the elements of the claims – whether individually or as a whole – evidence any "inventive concept." The concept of latency in communication paths was well understood, routine and conventional to one of ordinary skill in the art, as was the need to reduce latency between communication paths to keep messages or parts of messages from being received too far apart in time. All of the "transmission parameters" cited in the claims likewise were parameters well-understood to increase or decrease delay, or latency, (depending on whether the parameters were increased or decreased) both on individual communication paths and as between multiple communication paths. The use of such "transmission parameters" to increase or decrease delay was well-understood, routine and conventional to one of ordinary skill in the art at the time of the

alleged invention.

B. Invalidity Under 35 U.S.C. § 102 and/or 35 U.S.C. § 103

Claims 17-18 of the '881 Patent (the "Family 2 Patent") are anticipated and/or rendered obvious by at least the following references:

- U.S. Patent No. 6,222,858 ("Counterman")
- U.S. Patent No. 6,178,448 ("Gray")
- U.S. Patent No. 7,068,657 ("Keller-Tuberg")
- PCT Application No. PCT/NO99/0024, WO 99/39468 ("Edvardsen")
- ATM Forum Technical Committee, Inverse Multiplexing over ATM (IMA) Specification Version 1.0 ("IMA Spec 1.0")

The patents, publications, and references identified above qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g). The charts identified as Exhibits B-1 through B-5 demonstrate how TQ Delta's Asserted Claims of the Family 2 Patent are anticipated and/or rendered obvious by the references above. Each chart identifies certain prior art to the Family 2 Patent and identifies at least one citation in the prior art reference where each claim element of the asserted claims is disclosed. Though the charts provide illustrative citations to where each claim element may be found in the prior art, the cited references may contain additional disclosures of each claim element as well, and 2Wire reserves the right to assert that any claim element is disclosed in other portions of the cited references. In addition, 2Wire identifies, and incorporates here by reference, all prior art of record in the prosecution history of the Family 2 Patent (and all related patents and applications), and all prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports, or specifications), any of which may anticipate and/or render TQ Delta's Asserted Claims obvious. Further, 2Wire identifies any TQ Delta patents that claim the same

priority date as any of the Family 2 Patents and disclose the same subject matter and for which a terminal disclaimer was not filed during prosecution, under the doctrine of obviousness-type double patenting. Additional evidence regarding the features and elements of prior art references may be provided by witness testimony, or by additional documents and materials describing the prior art, that may be identified through the course of ongoing discovery and investigation.

To the extent that a reference above is found to be missing a limitation of TQ Delta's Asserted Claims, any one of the prior art references identified above may be combined with any one or more of the following references, all of which qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g), to render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103:

- U.S. Patent No. 5,617,417 ("Sathe")
- U.S. Patent No. 6,822,960 ("Manchester")
- U.S. Patent No. 5,617,417 ("Sathe")
- U.S. Patent No. 5,608,733 ("Valee '733")
- U.S. Patent No. 6,680,954 ("Cam")
- U.S. Patent No. 6,205,142 ("Vallee '142")
- U.S. Patent No. 5,727,051 ("Holender")
- U.S. Patent No. 6,178,448 ("Gray")
- U.S. Patent No. 6,408,005 ("Fan")
- U.S. Patent No. 6,941,252 ("Nelson")
- U.S. Patent No. 6,775,268 ("Wang '268")

- U.S. Patent No. 6,396,837 ("Wang '837")
- U.S. Patent No. 6,747,964 ("Bender")
- U.S. Patent No. 6,002,670 ("Rahman")
- U.S. Patent No. 7,343,543 ("Mantha")
- U.S. Patent No. 6,775,320 ("Tzannes '320")
- U.S. Patent No. 6,772,388 ("Cooper")
- U.S. Patent No. 6,956,872 ("Djokovic")
- EP1009154 (A2) ("Aravamudan")
- DSL Forum Recommendation TR-042
- ITU-T Recommendation G.992.1 (06/1999)
- Broadband Forum Recommendation TR-042

Specific combinations that render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103 using these references are set forth in Exhibits B-1 through B-5. Defendant reserves the right to rely on the references listed above for motivation to combine, the state of the art and/or the background knowledge of one of ordinary skill in the art.

In addition, any of the foregoing anticipatory or secondary prior art references listed above may be combined with any of the prior art of record in the prosecution history of the Family 2 Patent (and all related patents and applications), or with any prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports or specifications), to render TQ Delta's Asserted Claims obvious. Further, any of the foregoing anticipatory or secondary prior art listed above may be combined with one another to render TQ Delta's Asserted Claims obvious.

Moreover, one of ordinary skill in the art would have been motivated to combine one or

more of the prior art references identified above to arrive at the combination of elements recited in each of TQ Delta's Asserted Claims. The suggestion or motivation to modify or combine references for obviousness purposes is provided by the explicit and implicit teachings of the prior art identified by 2Wire, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved. As an initial matter, 2Wire notes that each prior art reference is in or relates to the same field, high-speed communications, and more specifically, ATM and DSL networks. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. The combination of prior art references identified in these contentions would have been obvious because the combinations represent the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry and the desire to improve features and performance would motivate the addition of features to systems as they become available, become smaller, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results. For example, one common, known method of handling a difference in delay was to provide an additional buffer or memory of appropriate size. Those in the DSL and high-speed communications industry understood that larger memory increased costs and complexity

of a transceiver or modem, and that a smaller, cheaper, less complex device was desirable. Moreover, those of ordinary skill in the art at the time of the alleged invention understood that increased differential delay in multiplexed (or "bonded") communications systems had the effect of slowing down overall data rates. Those of ordinary skill in the art also understood that providing higher overall data rates was desirable and could provide an advantage in the marketplace. The motivation to combine references is exemplary only, and should not be used to limit these disclosures. There would have been substantial motivation to combine the prior art references prior to the invention date, and 2Wire reserves the right to and intends to supplement the foregoing with expert and other testimony. More detailed bases for the motivation to combine specific references will be set forth in 2Wire's attached invalidity charts and expert report(s) on invalidity following claim construction and discovery on validity issues.

To the extent that TQ Delta raises any secondary considerations of non-obviousness, for example, in its expert reports, 2Wire reserves the right to address any such considerations.

C. Invalidity Under 35 U.S.C. § 112

2Wire lists below exemplary grounds upon which it contends TQ Delta's Asserted Claims are invalid for failure to meet one or more requirements of 35 U.S.C. § 112. A more detailed basis for 2Wire's written description, enablement, and indefiniteness defenses will be set forth in 2Wire's expert report(s) on invalidity. 2Wire reserves the right to supplement and/or amend these contentions based on Section 112 in light of discovery on invalidity issues and on any other basis permitted by the Court or the applicable rules. Such supplementation and/or amendments may include, but are not limited to, invalidity contentions based on indefiniteness, lack of written description, and/or lack of enablement.

Invalidity Under 35 U.S.C. § 112 ¶ 1: TQ Delta's Asserted Family 2 Claims are invalid because the patent specification does not include sufficient description of the subject

matterclaimed, and the manner and process of using it, in such full, clear, concise, and exact terms as to enable any person of ordinary skill in the art to which it pertains to make and use the claimed subject matter without undue experimentation. 2Wire further contends that the full scope of each asserted claim was not described with particularity in the specification to which priority is apparently sought, thereby setting forth insufficient detail to allow one of ordinary skill in the art to understand what is claimed and to recognize that the inventor(s) invented what is claimed. By way of example, and without limitation, at least the following elements are not enabled and/or fail to meet the written description requirement of Section 112:

- "utilizing at least one transmission parameter value to reduce a difference in latency" ('881 Patent, claims 17, 18)
- "bonded transceivers" ('881 Patent, claims 17, 18)
- "A plurality of bonded transceivers, each bonded transceiver utilizing at least one transmission parameter value to reduce a difference in latency between the bonded transceivers" ('881 Patent, claims 17, 18)

TQ Delta's Asserted Family 2 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to meet the enablement and/or written description requirements of Section 112.

The accused products do not infringe TQ Delta's Asserted Family 2 Claims for at least the reasons set out in the non-infringement charts previously provided by 2Wire, its Interrogatory Responses, and any supplements thereto. To the extent TQ Delta's Asserted Claims may eventually be construed so broadly as to cover the accused products, such a construction would render TQ Delta's Asserted Claims invalid for failure to meet the requirements of Section 112, paragraph 1.

Invalidity Under 35 U.S.C. § 112 ¶ 2: TQ Delta's Asserted Family 2 Claims are also invalid because they fail to particularly point out and distinctly claim the subject matter that the purported inventors claimed (i.e., the claims are indefinite). A person of ordinary skill in the art to which the purported invention pertains would not understand the scope of each asserted claim when read in light of the specification. By way of example, and without limitation, at least the following claim terms are indefinite under Section 112:

- "utilizing at least one transmission parameter value to reduce a difference in latency" ('881 Patent, claims 17, 18)
- "bonded transceivers" ('881 Patent, claims 17, 18)
- "reduce a difference in latency" ('881 Patent, claims 17, 18)
- "A plurality of bonded transceivers, each bonded transceiver utilizing at least one transmission parameter value to reduce a difference in latency between the bonded transceivers" ('881 Patent, claims 17, 18)

TQ Delta's Asserted Family 2 Claims (and all other claims in the asserted patent that include or depend from any claims that include any of the above limitations) are invalid because they fail to particularly point out and distinctly claim the subject matter that the applicants regarded as their invention.

Further, TQ Delta's Asserted Family 2 Claims are invalid under Section 112 because they purport to claim both an apparatus and a method of using the apparatus. *See IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed. Cir. 2005). To the extent that TQ Delta's Asserted Claims do not invoke 35 U.S.C. § 112, ¶ 6 (pre-AIA), those claims are invalid for merely claiming the function of an apparatus. Thus, each asserted claim is invalid as indefinite under Section 112, paragraph 2.

IV. INVALIDITY CONTENTIONS FOR PATENT FAMILY 3

A. Invalidity Under 35 U.S.C. § 101

TQ Delta's Asserted Family 3 Claims are invalid for failing to recite patentable subject matter under 35 U.S.C. § 101. Section 101 provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." Nonetheless, there are three recognized exceptions to Section 101: "laws of nature, physical phenomena, and abstract ideas." *Bilski v. Kappos*, 561 U.S. 593, 601 (2010) (*quoting Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)).

TQ Delta's Asserted Family 3 Claims are invalid for claiming no more than an abstract idea. In *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014), the Supreme Court set out a two-part test for determining whether a claim recites patent-eligible subject matter. First, the court must determine whether the claims at issue are directed toward laws of nature, natural phenomena, or abstract ideas. *Id.* at 2355. Second, if the claims are directed toward ineligible subject matter, the court must then consider the claim elements – both individually and as an ordered combination – to determine whether they add an "inventive concept." *Id.* Merely claiming a generic "computer" to implement an abstract idea is not sufficient to transform the computer into a patent-eligible invention. *Id.* at 2357-50.

Here, TQ Delta's Asserted Family 3 Claims are drawn to no more than the abstract idea of dividing a shared resource between two needs as instructed. Dividing resources according to needs is a long-standing practice in almost every human endeavor, both technological and social. For example, one might instruct an assistant to allocate space in filing cabinets to different cases depending on the rate at which information or materials are filed in one case versus the other. Nor do the elements of the claims – whether individually or as a whole – evidence any

"inventive concept." The claims are untethered to any specific implementation or environment, and the patents and specification do not limit the concept of allocating a shared resource.

The claims purport to relate to allocation of a shared memory between functions in a technological environment in accordance with an instruction or message, but the concept of allocation of memory between functions in accordance with an instruction is perhaps one of the most fundamental aspects of any general purpose computer processing system and is well known. *See, e.g.*, U.S. Pat. No. 4,827,406, issued May 2, 1989 to Bischoff et al., at col. 1:39-45 ("In one prior art system employing a main processor and a secondary processor (co-processor) sharing utilization of a single bus, the main processor, with the aid of an advanced operating system, allocated portions of a large, main memory to various devices, such as the co-processor, direct memory access controller (OMA), and other intelligent controllers."); *id.* at col. 1:64-2:2 ("It would, therefore, be highly advantageous to provide a large, common memory to be allocated in subdivisions, or pages, to each of a plurality of processors sharing a bus, without the necessity of utilizing a highly advanced operating system, or 'on-board', rigidly dedicated memory, individually associated with the each of the processors."); U.S. Patent No. 5,689,707 to Donnelly et al., at col. 1:16-18 ("Computer operating systems dynamically allocate memory in a computer system while executing programs, i.e., processes, to use for specific functions."); U.S. Pat. No. 5,159,681, issued Oct. 27, 1992 to Beck et al. at Abstract ("A memory management system for a page printer controller (11) which includes random access memory (17) allocated among bit map memory (30), page buffer memory (29), and user memory (28). The memory management system allocates the random access memory to provide either a large bit map memory or, responsive to needs of the controller (11) for increased memory for other uses, for allocating the random access memory (17) to provide a small bit map memory and place more

memory in the page buffer memory (29) and user memory (28).”). All recited elements of the apparatus (e.g., interleavers, deinterleavers, transceivers, shared memories) were staples of telecommunications in many fields including DSL communications, and even the exchange of messages to identify memory requirements for the recited functions was a well-known and necessary practice in DSL communications. *See, e.g.*, Exhibits C-4 and C-10, addressing U.S. Patent No. 6,707,822 to Fadavi-Ardekani et al. (“Fadavi-Ardekani”) in view of ITU-T Recommendation G.993.1 (6/2004) and in view of ITU-T Recommendation G.992.2 (1999). The only purported addition is the idea of allocating a shared resource as instructed, which is abstract and is not an inventive concept.

B. Invalidity Under 35 U.S.C. § 102 and/or 35 U.S.C. § 103

Claim 1 of the ’048 Patent, claims 19 of the ’473 Patent, claim 5 of the ’381 Patent, and claim 13 of the ’882 Patent (collectively, “Family 3 Patents”) are anticipated and/or rendered obvious by at least the following references:

- U.S. Patent No. 5,063,533 (“Erhart”)
- U.S. Patent Pub. No. 2005/0034046 (“Berkmann”)
- U.S. Patent No. 6,484,283 (“Stephen”)
- U.S. Patent No. 5,912,898 (“Khoury”)
- U.S. Patent No. 7,200,169 (“Suzuki”)
- U.S. Patent No. 6,775,320 (“Tzannes ’320”)
- U.S. Patent No. 6,381,728 (“Kang”)
- U.S. Patent No. 5,751,741 (“Voith”)
- U.S. Patent No. 7,269,208 (“Mazzoni”)
- U.S. Patent No. 6,707,822 to Fadavi-Ardekani et al. (“Fadavi-Ardekani”)
- ITU-T Recommendation G.993.1 (6/2004)

- ITU-T Recommendation G.992.1 (1999)
- ITU-T Recommendation G.992.2 (1999)
- ITU-T SG15/Q4 Contribution LB-031 ("LB-031")

In addition, the content of the Background section of the U.S. Patent No. 8,495,473 ("the '473 patent") is admitted prior art to the '473 Patent ("Admissions"). *See, e.g.*, '473 patent at col. 1:20-45.

Specific combinations that render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103 using these references are set forth in Exhibits C-1 through C-11, D-1 through D-25, E-1 through E-11, and F-1 through F-11. Defendant reserves the right to rely on the references listed above for motivation to combine, the state of the art and/or the background knowledge of one of ordinary skill in the art.

The patents, publications, and references identified above qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g). The charts identified as Exhibits C-1 through C-11, D-1 through D-25, E-1 through E-11, and F-1 through F-11 demonstrate how TQ Delta's Asserted Family 3 Claims are anticipated and/or rendered obvious by the references above. Each chart identifies certain prior art to the Family 3 Patents and identifies at least one citation in the prior art reference where each claim element of the asserted claims is disclosed. Though the charts provide illustrative citations to where each claim element may be found in the prior art, the cited references may contain additional disclosures of each claim element as well, and 2Wire reserves the right to assert that any claim element is disclosed in other portions of the cited references. In addition, 2Wire identifies, and incorporates here by reference, all prior art of record in the prosecution history of the Family 3 Patents (and all related patents and applications), and all prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports, or specifications), any

of which may anticipate and/or render TQ Delta's Asserted Family 3 Claims obvious.

To the extent that a reference above is found to be missing a limitation of TQ Delta's Asserted Family 3 Claims, any one of the prior art references identified above may be combined with any one or more of the following references, all of which qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g), to render TQ Delta's Asserted Family 3 Claims obvious under 35 U.S.C. § 103:

- U.S. Patent Pub. No. 20030179770 ("Reznic")
- U.S. Patent Pub. No. 20050034046 ("Berkmann")
- U.S. Patent Pub. No. 20050254441 ("Levi")
- U.S. Patent Pub. No. 2003008821 ("Yokokawa")
- U.S. Patent Pub. No. 20030093750 ("Cameron")
- U.S. Patent Pub. No. 20010039637 ("Bengough")
- U.S. Patent No. 5063533 ("Erhart")
- U.S. Patent No. 5563915 ("Stewart")
- U.S. Patent No. 5751741 ("Voith")
- U.S. Patent No. 5757416 ("Birch")
- U.S. Patent No. 5867400 ("El-Ghoroury")
- U.S. Patent No. 5912898 ("Khoury")
- U.S. Patent No. 5968200 ("Amrany")
- U.S. Patent No. 5991857 ("Koetje")
- U.S. Patent No. 6151690 ("Peeters")
- U.S. Patent No. 6392572 ("Shiu")

- U.S. Patent No. 6480976 ("Pan")
- U.S. Patent No. 6484283 ("Stephen")
- U.S. Patent No. 6553534 ("Yonge")
- U.S. Patent No. 6704848 ("Song")
- U.S. Patent No. 6922444 ("Cai")
- U.S. Patent No. 6988234 ("Han")
- U.S. Patent No. 7187708 ("Shiu")
- U.S. Patent No. 7200169 ("Suzuki")
- U.S. Patent No. 7266132 ("Liu")
- U.S. Patent No. 7269208 ("Mazzoni")
- KR100295086B
- Eberle, *80-Mb/s QPSK and 72-Mb/s 64-QAM Flexible and Scalable Digital OFDM Transceiver ASICs for Wireless Local Area Networks in the 5-GHz Band*, IEEE Journal Of Solid-State Circuits, Vol. 36, No. 11, November 2001, p. 1829
- Texas Instruments, Inc., ITU-T SG15/Q4 Contribution LB-031, "VDSL2 – Constraining the Interleaver Complexity" ("LB-031")

In addition, any of the foregoing anticipatory or secondary prior art references listed above may be combined with any of the prior art of record in the prosecution history of the Family 3 Patents (and all related patents and applications), or with any prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports or specifications), to render TQ Delta's Asserted Family 3 Claims obvious. Further, any of the foregoing anticipatory or secondary prior art listed above may be combined with one another to render TQ Delta's Asserted Family 3 Claims obvious.

Moreover, one of ordinary skill in the art would have been motivated to combine one or more of the prior art references identified above to arrive at the combination of elements recited in each of TQ Delta's Asserted Family 3 Claims. The suggestion or motivation to modify or combine references for obviousness purposes is provided by the explicit and implicit teachings of the prior art identified by 2Wire, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved. As an initial matter, 2Wire notes that each prior art reference is in or relates to the same field, high-speed communications and DSL systems. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. The combinations of prior art references identified in these contentions would have been obvious because the combinations represent the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry and the desire to improve features and performance would motivate the addition of features to systems as they become available, become smaller, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results. Those in the industry had long recognized that memory in a DSL (or other telecommunications) transceiver was a significant source of expense, complexity, and inefficiency. The benefits of

sharing memory between multiple processes or latency paths (for example, an interleaver and a deinterleaver) to reduce the amount of memory required in a system (and in turn, the cost) had also been recognized by those of ordinary skill in the art. Those of ordinary skill in the art had also recognized that allocating the ability to change the allocation of interleaver and deinterleaver memory would likewise be advantageous to further reduce the amount of memory required. The motivation to combine references is exemplary only, and should not be used to limit these disclosures. There would have been substantial motivation to combine the prior art references prior to the invention date, and 2Wire reserves the right to and intends to supplement the foregoing with expert and other testimony. More detailed bases for the motivation to combine specific references will be set forth in 2Wire's invalidity charts, and 2Wire's expert report(s) on invalidity.

There are no secondary considerations of non-obviousness pertinent to the obviousness of the subject matter of the asserted claims. To the extent that TQ Delta raises any secondary considerations of non-obviousness, for example, in its expert reports, 2Wire reserves the right to address any such considerations, including by taking discovery on those issues and supplementing and/or amending its invalidity contentions, as well as through 2Wire's expert report(s).

In addition, the asserted claims of Family 3 are invalid under the printed matter doctrine because certain limitations claim printed matter (i.e., content of information) that is not functionally or structurally related to the medium containing the printed matter. In the alternative, the asserted claims of Family 3 are invalid under the printed matter doctrine because certain limitations claim printed matter and are not entitled to patentable weight, without which the claims are anticipated or rendered obvious by the cited references. By way of example and

not of limitation, printed matter includes limitations directed to the contents of messages or data variables, such as a "message . . . specifying a maximum number of bytes of memory that are available to be allocated to an interleaver" or that data bytes are "Reed Solomon (RS) coded data bytes."

Moreover, the Asserted Family 3 Claims are invalid to the extent that the named inventors did not themselves invent the subject matter sought to be patented. *See* 35 U.S.C. § 102(f). For example, named inventor Michael Lund testified that he did not recall to what extent he worked on the claimed subject matter of the Family 3 patents, and that he did not recall being involved in prosecution of the claimed subject matter of the Family 3 patents. *See* Transcript of Deposition of Michael A. Lund, Nov. 30, 2017 at *e.g.*, 67:8-74:7, 75:20-76:8, 79:21-80:13.

2Wire reserves the right to amend and supplement these § 102(f) contentions as further information and discovery are obtained including, in particular, with regard to the alleged conception and reduction-to-practice of the patents-in-suit.

C. Invalidity Under 35 U.S.C. § 112

2Wire lists below exemplary grounds upon which TQ Delta's Asserted Family 3 Claims are invalid for failure to meet one or more requirements of 35 U.S.C. § 112. A more detailed basis for 2Wire's written description, enablement, and indefiniteness defenses will be set forth in 2Wire's expert report(s) on invalidity. Furthermore, discovery regarding invalidity (e.g., inventor depositions, etc.) is ongoing. 2Wire reserves the right to supplement and/or amend these contentions based on Section 112 in light of discovery on invalidity issues. Such supplementation and/or amendments may include, but are not limited to, and/or invalidity contentions based on indefiniteness, lack of written description, and/or lack of enablement should the claims be construed under 35 U.S.C. § 112 ¶ 6.

Invalidity Under 35 U.S.C. § 112 ¶ 1: TQ Delta's Asserted Family 3 Claims are invalid

because the patent specification does not include sufficient description of the claimed subject matter, and the manner and process of using it, in such full, clear, concise, and exact terms as to enable any person of ordinary skill in the art to which it pertains to make and use the claimed subject matter without undue experimentation. 2Wire further contends that the full scope of each of TQ Delta's Asserted Family 3 Claims was not described with particularity in the specification to which priority is apparently sought, thereby setting forth insufficient detail to allow one of ordinary skill in the art to understand what is claimed and to recognize that the inventor(s) invented what is claimed. By way of example, and without limitation, at least the following elements are not enabled and/or fail to meet the written description requirement of Section 112:

- "a maximum number of bytes of memory that are available to be allocated" ('048 Patent, claim 1; '381 Patent, claim 5; '882 Patent, claim 13);
- "wherein the shared memory allocated to the [interleaver/deinterleaver] is used at the same time as the shared memory allocated to the [deinterleaver/interleaver]" ('048 Patent, claim 1; '381 Patent, claim 5; '882 Patent, claim 13);
- "wherein at least a portion of the memory may be allocated to the interleaving function or the deinterleaving function at any one particular time depending on the message." ('473 Patent, claim 19)

TQ Delta's Asserted Family 3 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to meet the enablement and/or written description requirements of Section 112.

2Wire's accused products do not infringe TQ Delta's Asserted Family 3 Claims for at least the reasons set out in the non-infringement charts previously provided by 2Wire, and any supplements thereto. To the extent TQ Delta's Asserted Family 3 Claims may eventually be

construed so broadly as to cover the accused products, such a construction would render those claims invalid for failure to meet the requirements of Section 112, paragraph 1.

Invalidity Under 35 U.S.C. § 112 ¶ 2: TQ Delta's Asserted Family 3 Claims are also invalid because they fail to particularly point out and distinctly claim the subject matter that the purported inventors claimed. 2Wire contends that a person of ordinary skill in the art to which the purported invention pertains would not understand the scope of each asserted claim when read in light of the specification. By way of example, and without limitation, at least the following claim terms are indefinite under Section 112:

- "a maximum number of bytes of memory that are available to be allocated" ('048 Patent, claim 1, '381 Patent, claim 5, '882 Patent, claim 13);
- "wherein the shared memory allocated to the interleaver is used at the same time as the shared memory allocated to the deinterleaver" ('048 Patent, claim 1, '381 Patent, claim 5, '882 Patent, claim 13);
- "wherein at least a portion of the memory may be allocated to the interleaving function or the deinterleaving function at any one particular time depending on the message." ('473 Patent, claim 19)

TQ Delta's Asserted Family 3 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to particularly point out and distinctly claim the subject matter that the applicants regard as their invention.

Further, TQ Delta's Asserted Family 3 Claims are invalid under Section 112. *See IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed. Cir. 2005). "*IPXL* indefiniteness arises when a person of ordinary skill in the art would be unable to tell if the apparatus itself

would infringe or if the apparatus would have to be used in a certain way to infringe." *Sound View Innovations, LLC v. Facebook, Inc*., No. 16-cv-116, 2017 WL 2221177, at *8 (D. Del. May 19, 2017) (Andrews, J.) (discussing *IPXL* 430 F.3d at 1384). Although *IPXL* addressed a claim that recited both an apparatus and method steps, the Federal Circuit recognized that the reason such claims are indefinite under section 112, paragraph 2 is that they are "not sufficiently precise to provide competitors with an accurate determination of the 'metes and bounds' of protection involved," making it unclear when infringement occurs. *IPXL*, 430 F.3d at 1384 (citation omitted). Thus, the focus of the inquiry is whether a person of ordinary skill in the art would know when infringement occurs, and whether the claim "does not apprise a person of ordinary skill in the art of its scope." *Id*. Moreover, after *IPXL* issued, the Supreme Court confirmed the critical public notice function of Section 112, Paragraph 2. *See Nautilus, Inc. v. Biosig Instruments, Inc*., 134 S. Ct. 2120, 2130 (2014) (warning against "diminish[ing] the definiteness requirement's public-notice function" and "foster[ing] the innovation-discouraging zone of uncertainty against which this Court has warned") (citation and internal quotation marks omitted).

Claim 13 of the '882 patent, and claim 19 of the '473 patent are all indefinite under *IPXL*. Claim 13 of the '882 patent is directed to a "system that allocates shared memory" comprising "a transceiver." The claim then recites that the transceiver "performs" a list of method steps: "transmitting or receiving a message…," "determining an amount of memory…," "allocating a first number of bytes…," "allocating a second number of bytes…," and "deinterleaving the first plurality of RS coded data bytes… ." The use of the present participle ("ing") within the claim indicates the presence of method steps. *Compare Sound View Innovations*, 2017 WL 2221177, at *9 (observing that claim language using "the present participle form of verbs" such as

"receiving" and "repeating" is "suggestive of method claiming" and finding claim indefinite under *IPXL*). The system claim's ordered references to transmitting or receiving a message, allocating a first number of bytes, and allocating a second number of bytes likewise bears the hallmarks of method claiming. *See id*. at *10 (finding that recitation of a "first" message received and a "second" message received indicated "order," as one aspect of method claiming). The first step of the claim recites an apparatus, which would normally indicate that merely buying, using, or selling the apparatus would infringe the claim. The later limitations introduce method steps, such as receiving messages and allocating memory. Viewed by themselves, these would be method steps that would have to be performed in order for the claim to be infringed. Viewed together, it is unclear whether a system with a transceiver itself infringes, or whether the transceiver must be used to perform each of the recited steps to infringe. Thus, this claim is indefinite. *Sound View Innovations*, 2017 WL 2221177, at *8; *IPXL*¸ 430 F.3d at 1384.

Claim 19 of the '473 patent is also indefinite because it is unclear when infringement might occur. Claim 19 recites an apparatus, "a multicarrier communications transceiver," but later steps recite "wherein the memory is allocated between" interleaving and deinterleaving functions in accordance with a message "received during initialization of the transceiver." The claim recites an apparatus, but also indicates that the invention requires allocating memory in accordance with a message received during initialization. This implies that the message must have been received, and the memory must have been allocated according to the message to practice the invention. One of ordinary skill in the art would not know whether infringement occurred merely by owning the transceiver, or if the memory must be allocated in advance, or already allocated when sold, to infringe. Thus, this claim is indefinite. *Sound View Innovations*, 2017 WL 2221177, at *8; *IPXL*¸ 430 F.3d at 1384. 2Wire incorporates by reference Defendants'

portions of the Parties' Joint Claim Construction Brief for Family 3 Patents, and any declarations in support, regarding these terms and invalidity under *IPXL* as if fully set forth herein.

V. INVALIDITY CONTENTIONS FOR PATENT FAMILY 4

A. Invalidity Under 35 U.S.C. § 101

2Wire contends that the Asserted Family 4 Claims are invalid for failing to recite patentable subject matter under 35 U.S.C. § 101. In particular, claim 26 of the '627 Patent, claim 14 of the '041 Patent, and claim 14 of the '008 Patent are invalid for claiming no more than an abstract idea or principle. In *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014), the Supreme Court set forth a two-part test for determining whether a claim recites patent-eligible subject matter. First, the court must determine whether the claims at issue are directed toward laws of nature, natural phenomena, or abstract ideas. *Id.* at 2355. Second, if the claims are directed toward ineligible subject matter, the court must then consider the claim elements – both individually and as an ordered combination – to determine whether they add an "inventive concept." *Id.* Merely claiming a generic "computer" to implement an abstract idea is not sufficient to transform the computer into a patent-eligible invention. *Id.* at 2357-50.

Here, claim 26 of the '627 Patent, claim 14 of the '041 Patent, and claim 14 of the '008 Patent are drawn to no more than the abstract idea of scrambling the phases of input bit streams in a multicarrier system to reduce the incidence of signal clipping and transmission errors. Multicarrier systems themselves were known in the art long before the earliest effective filing date of the Family 4 Claims. Signal clipping is a long-standing, well-known issue in multicarrier systems, and phase scrambling is a well-known engineering practice. *See, e.g.*, U.S. Patent No. 2,229,387 (patent issued in 1942 stating that "The use of synchronizing impulses for correcting the phase relation of rotary apparatus at a receiving station is well-known and highly developed in the fields of automatic telegraphy and television."). The phase scrambling recited by claim 26

of the ’627 Patent, claim 14 of the ’041 Patent, and claim 14 of the ’008 Patent are mere well-understood, routine and conventional mathematical transformations. Nor are these claims tethered to a particular implementation or environment with respect to phase scrambling and calculating a phase shift. For example, the recitation of a “transceiver” does not impart structure to the claims as the specification teaches that the phase shifting can be executed by software. *See, e.g.,* ’627 Patent, col. 4:43-51; *see also* ’041 Patent, col. 4:38-46. Moreover, claim 26 of the ’627 Patent, claim 14 of the ’041 Patent, and claim 14 of the ’008 Patent are not tied to, and do not recite, any specific algorithm, nor do they disclose any special-purpose processor.

B. Invalidity Under 35 U.S.C. § 102 and/or 35 U.S.C. § 103

Claim 26 of the ’627 Patent, claim 14 of the ’041 Patent, and claim 14 of the ’008 Patent are anticipated and/or rendered obvious by at least the following references:

- U.S. Patent No. 6,625,219 (“Stopler”)
- U.S. Patent No. 6,963,599 (“Dunn”)
- U.S. Patent No. 6,125,103 (“Bauml”)
- U.S. Patent No. 5,682,376 (“Hayashino”)
- U.S. Patent No. 6,556,557 (“Cimini”)
- U.S. Patent No. 5,903,614 (“Suzuki ’614”)
- U.S. Patent No. 6,301,268 (“Laroia”)
- U.S. Patent No. 6,781,951 (“Fifield”)
- U.S. Patent No. 6,310,869 (“Holtzman”)
- U.S. Prov. App. Ser. No. 60/164,134 (applicant’s admissions)
- U.S. Patent No. 7,292,627 (“Tzannes ’627”)
- U.S. Patent No. 7,471,721 (“Tzannes ’721”)
- U.S. Patent No. 8,073,041 (“Tzannes ’041”)

- U.S. Patent No. 8,090,008 ("Tzannes '008")
- U.S. Patent No. 8,218,610 ("Tzannes '610")
- U.S. Patent No. 8,355,427 ("Tzannes '427")
- EP 0 743 768 A1 ("Narahashi")
- U.S. Patent No. 6,088,406 ("Suzuki '406")
- EP 0 895 389 A2 Williams ("Williams")
- U.S. Patent No. 4,924,516 ("Bremer")
- U.S. Patent No. 6,657,949 ("Jones")
- U.S. Patent No. 5,694,415 ("Suzuki '415")
- Boyd, IEEE Transactions on Circuits and Systems, Vol. Cas-33, No. 10, Oct. 1986 ("Boyd")
- EP 0 552 034 A2 ("Kaku")
- U.S. Patent No. 6,144,696 ("Shively")
- U.S. Patent No. 6,590,893 ("Hwang")
- U.S. Patent No. 6,590,860 ("Sakoda")
- T1E1.4 Contribution No. T1E1.4/97-270 by Djokovic ("Djokovic")
- T1.413-1995 – "Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface" ("T1.413-1995")
- T1.413-Issue 2 – "Standards Project for Interfaces Relating to Carrier to Customer Connection of Asymmetrical Digital Subscriber Line (ADSL) Equipment," June 5, 1998. ("T1.413 – 1998")

The patents, publications, and references identified above qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g). The charts identified as Exhibits G-1 through G-19, H-1 through H-19, and J-1 through J-19 demonstrate how the asserted claims of the '627 Patent, '041 Patent, and '008 Patent are anticipated and/or rendered obvious by the references above. Each chart identifies certain prior art to the '627 Patent, '041 Patent, and '008

Patent and identifies at least one citation in the prior art reference where each claim element of the asserted claims is disclosed. Though the charts provide illustrative citations to where each claim element may be found in the prior art, the cited references may contain additional disclosures of each claim element as well, and 2Wire reserves the right to assert that any claim element is disclosed in other portions of the cited references. In addition, 2Wire identifies, and incorporates herein by reference, all prior art of record in the prosecution history of the '627 Patent, '041 Patent, and '008 Patent (and all related patents and applications), and all prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports, or specifications), any of which may anticipate and/or render the asserted claims obvious. Further, 2Wire identifies any TQ Delta patents that claim the same priority date as the '627 Patent, the '041 Patent, and the '008 Patent and disclose the same subject matter and for which a terminal disclaimer was not filed during prosecution, under the doctrine of obviousness-type double patenting. This includes, but is not limited to, U.S. Patent No. 7,471,721 and U.S. Patent No. 8,218,610. Additional evidence regarding the features and elements of prior art references may be provided by witness testimony, or by additional documents and materials describing the prior art, that may be identified through the course of ongoing discovery and investigation.

To the extent that a reference above is found to be missing a limitation of the representative claims, any one of the prior art references identified above may be combined with one another or with any one or more of the following references, all of which qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g), to render the representative claims obvious under 35 U.S.C. § 103:

- U.S. Patent No. 5,694,415 ("Suzuki '415")

- U.S. Patent No. 5,896,419 (“Suzuki ’419”)
- U.S. Patent No. 6,233,247 (“Alami”)
- U.S. Patent No. 6,240,141 (“Long”)
- U.S. Patent No. 6,757,299 (“Verma”)
- U.S. Patent No. 6,590,860 (“Sakoda”)
- U.S. Patent No. 6,507,585 (“Dobson”)
- U.S. Patent No. 4,408,298 (“Ruhland”)
- U.S. Patent No. 3,811,038 (“Reddaway”)
- U.S. Patent No. 4,672,629 (“Beier”)
- U.S. Patent No. 4,924,516 (“Bremer”)
- U.S. Patent No. 5,694,389 (“Seki”)
- U.S. Patent No. 6,324,171 (“Lee”)
- U.S. Patent No. 6,438,186 (“Strait”)
- U.S. Patent No. 5,101,417 (“Richley”)
- U.S. Patent No. 6,389,080 (“Barnes”)
- U.S. Patent No. 6,081,502 (“Paneth”)
- U.S. Patent No. 6,112,094 (“Dent”)
- U.S. Patent No. 6,731,594 (“Bohnke”)
- U.S. Patent No. 5,367,516 (“Miller”)
- U.S. Patent No. 6,625,219 (“Stopler”)
- U.S. Patent No. 6,963,599 (“Dunn”)
- U.S. Patent No. 6,125,103 (“Bauml”)
- U.S. Patent No. 5,682,376 (“Hayashino”)
- U.S. Patent No. 6,556,557 (“Cimini”)

- U.S. Patent No. 5,903,614 ("Suzuki '614")
- U.S. Patent No. 6,301,268 ("Laroia")
- U.S. Patent No. 6,781,951 ("Fifield")
- U.S. Patent No. 6,310,869 ("Holtzman")
- EP 0 552 034 A2 ("Kaku")
- EP 0 743 768 A1 ("Narahashi")
- EP 0 895 389 A2 Williams ("Williams")
- U.S. Patent No. 6,088,406 ("Suzuki '406")
- U.S. Patent No. 6,657,949 ("Jones")
- M.J.E. Golay, "Complementary Series," IRE Trans. on Information Theory, Apr. 1961 ("Golay")
- S. Narahashi and T. Nojima, "A New Phasing Scheme for Multitone Signal Systems to Reduce Peak-to-Average Power Ratio," Elecs. and Commn's in Japan, Part 1, Vol. 80, No. 1.
- Mestdagh, D.J.G and P.M.P. Spruyt, "A Method to Reduce the Probability of Clipping in DMT-Based Transceivers," IEEE Trans. on Communications, Vol. 44, No. 10.
- Bauml, R.W. et al., "Reducing the Peak-to-Average Power Ratio of Multicarrier Modulation by Selected Mapping," Electronics Letters, Vol. 32, No. 22.
- Muller, S.H. and J.B. Huber, "A Novel Peak Power Reduction Scheme for OFDM," IEEE 1997.
- T1.413-Issue 2 – "Standards Project for Interfaces Relating to Carrier to Customer Connection of Asymmetrical Digital Subscriber Line (ADSL) Equipment," June 5, 1998. ("T1.413 – 1998")
- ANSI Technical Report, TR-004, Network Migration ("TR-004")
- T1E1.4 Contribution No. T1E1.4/97-270 by Djokovic ("Djokovic")
- T1.413-1995 – "Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface" ("T1.413-1995")

Specific combinations that render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103

using these references are set forth in Exhibits G-1 though G-19, H-1 through H-19, and J-1 through J-19. Defendant reserves the right to rely on the references listed above for motivation to combine, the state of the art and/or the background knowledge of one of ordinary skill in the art.

In addition, any of the foregoing anticipatory or secondary prior art references listed above may be combined with any of the prior art of record in the prosecution history of the '627 Patent, the '041 Patent, and the '008 Patent (and all related patents and applications), or with any prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports or specifications), to render the asserted claims obvious. Further, any of the foregoing anticipatory or secondary prior art references listed above may be combined with one another to render the asserted claims obvious.

Moreover, one of ordinary skill in the art would have been motivated to combine one or more of the prior art references identified above to arrive at the combination of elements recited in each asserted claim. The suggestion or motivation to modify or combine references for obviousness purposes is provided by the explicit and implicit teachings of the prior art identified by 2Wire, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved. As an initial matter, 2Wire notes that each prior art reference is in or relates to the same field. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. The combination of prior art references identified in these contentions would have been obvious because the combinations represent the known potential options with a reasonable

expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry and the desire to improve features and performance would motivate the addition of features to systems as they become available, become smaller, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results.

By way of example only, the Patent Trial and Appeal Board has concluded that it would have been obvious for one of skill in the art to combine Stopler and Shively because the combination is the use of a known technique to improve a similar device, method or product in the same way. IPR2016-01021, Paper 44 at 18, 28-35. Similar reasoning applies to any combination of multicarrier communication devices and references teaching phase adjustment or randomization and scrambling techniques. One of skill in the art would have known that multicarrier transmission techniques suffer from the disadvantage of high peak power during transmission from constructive overlap of the subchannels. *See*, *e.g.*, Bauml at Abstract, 1:46-50; Jones at 5:49-56; T1.413-1998 at p.40. This is particularly true when multiple subchannels carry the same information. The applicant admitted that sending the same data bits on different carriers was a well-known method to decrease bit error rate and further admitted that sending the same data bits on multiple carriers was a known cause of the known problem of high peak-to-average power ratio in a transmission signal. U.S. Prov. App. Ser. No. 60/164,134 at 1-2. One of skill in the art would have also known that adjusting the phase characteristics of carrier signals in order to scramble the transmission signal was a known method to address high peak-to-average

ratio in a transmission signal. For example, Boyd, IEEE Transactions on Circuits and Systems, Vol. Cas-33, No. 10, Oct. 1986, at 1019, explains that the crest factor, or peak to average ratio, of a multitone signal is improved by the use of a random pattern of phases. As a further example, Jones explains that phase scrambling can be used when certain combinations of data symbols will result in an excessive peak to average power ratio. Jones at 5:44-56. As a further example, Williams explains that randomization of constellation points using a pseudo-random number sequence (that can be replicated to de-randomize on the receiver side) can be used to prevent undesirable large impulses in a transmission signal that would cause distortion close to the saturation or clipping point. Williams at ¶ 44. The foregoing citations are illustrative only. The prior art, including the prior art references detailed in Exhibits G-1 through G-19, H-1 through H-19, and J-1 through J-19 contain ample additional disclosures establishing these points.

When designing a multicarrier system, particularly one in which the same data bits are or may be sent on multiple carriers, one of skill in the art would have known of the peak-to-average ratio issue and looked to other references in the telecommunications field describing how to adjust the phases of the carriers in order to scramble the transmission signal and address the peak-to-average ratio issue. To the extent that any references teaching adjusting the phases of carriers are not explicitly multicarrier systems, one of skill in the art would have understood that the teaching could be applied to each carrier in a multicarrier system in order to adjust the phases of the carriers relative to each other. Combining various references describing how to adjust the phases of the carriers in order to scramble the transmission signal with references teaching a multicarrier communication system in order to address the peak-to-average ratio issue is nothing more than using a known technique to improve a similar device, method, or product in the same

way. Moreover, market forces would have motivated one of skill in the art to make these combinations. As admitted by the applicant, it was known in the art that high peak-to-average ratio can adversely affect power consumption and component requirements. '627 patent col. at 2:5-9. In addition, it was known in the art and admitted as known by the applicant that high peak-to-average power ratio can cause signal clipping, which results in transmission errors. *See, e.g.*, T1.413-1998 at p. 40; U.S. Prov. App. Ser. No. 60/164,134 at 1. One of skill in the art would have been well aware of these adverse effects. A skilled artisan would have looked for ways to address the peak-to-average power ratio issue to mitigate those adverse effects and would have known that phase scrambling of the carriers provided a known solution.

The motivation to combine references and specific illustrative references used above are exemplary only, and should not be used to limit these disclosures. There would have been substantial motivation to combine the prior art references prior to the invention date, and 2Wire reserves the right to and intends to supplement the foregoing with expert and other testimony. More detailed bases for the motivation to combine specific references will be set forth in 2Wire's invalidity charts and expert report(s) on invalidity.

2Wire reserves the right to amend and supplement these § 102 contentions as further information and discovery are obtained including, in particular, with regard to the alleged conception and reduction-to-practice of the patents-in-suit.

C. Invalidity Under 35 U.S.C. § 112

2Wire lists below exemplary grounds upon which the asserted claims are invalid for failure to meet one or more requirements of 35 U.S.C. ¶ 112. A more detailed basis for 2Wire's written description, enablement, and indefiniteness defenses will be set forth in 2Wire's expert report(s) on invalidity. Furthermore, 2Wire has not yet had an opportunity to conduct full discovery regarding invalidity (e.g., inventor depositions, etc.). 2Wire has therefore been unable

to fully evaluate and formulate these and other invalidity contentions. 2Wire reserves the right to supplement and/or amend these contentions based on Section 112. Such supplementation and/or amendments may include, but are not limited to, invalidity contentions based on indefiniteness, lack of written description, and/or lack of enablement should the claims be construed under 35 U.S.C. § 112 ¶ 6.

Invalidity Under 35 U.S.C. § 112 ¶ 1: The asserted claims are invalid because the patent specification does not include sufficient description of the subject matter claimed, and the manner and process of using it, in such full, clear, concise, and exact terms as to enable any person of ordinary skill in the art to which it pertains to make and use the claimed subject matter without undue experimentation. In addition, the specification to which TQ Delta apparently seeks priority does not describe the full scope of each asserted claim with particularity, thereby setting forth insufficient detail to allow one of ordinary skill in the art to understand what is claimed and to recognize that the inventor(s) invented what is claimed. By way of example, and without limitation, at least the following elements are not enabled and/or fail to meet the written description requirement of Section 112:

- "a multicarrier modulation transceiver [a multicarrier system including a first transceiver] that uses [a transmission signal having] a plurality of carrier signals for modulating an input bit stream" ('627 Patent, claim 26; '008 Patent, claim 14)
- "wherein the multicarrier modulation transceiver is capable of associating each carrier signal with a value determined independently of any input bit value" ('627 Patent, claim 26)
- "computing a phase shift for each carrier signal based on the value associated with that carrier signal" ('627 Patent, claim 26)

- "combining the phase shift computed for each carrier signal with the phase characteristic of that carrier signal so as to substantially scramble the phase characteristics of the plurality of carrier signals" ('627 Patent, claim 26)
- "wherein the value varies with each DMT symbol" ('627 Patent, claim 26)
- "a phase shift for each carrier signal is based on . . . the combining of a phase shift for each carrier signal with the phase characteristic of that respective carrier signal so as to substantially scramble the phase characteristics of the plurality of carrier signals" ('041 Patent, claim 14)
- "multiple carrier signals corresponding to the plurality of phase shifted and scrambled carrier signals are used by the first multicarrier transceiver to demodulate a same input bit value of the received bit stream" ('041 Patent, claim 14)
- "combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals" ('008 Patent, claim 14)
- "wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value" ('008 Patent, claim 14).

The asserted claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to meet the enablement and/or written description requirements of Section 112.

2Wire's accused products do not infringe the representative claims for at least the reasons set out in the non-infringement charts previously provided by 2Wire. To the extent that TQ

Delta contends that the asserted claims have been construed so broadly as to cover the accused products, such a construction would render the asserted claims invalid for failure to meet the requirements of Section 112, paragraph 1.

Invalidity Under 35 U.S.C. § 112 ¶ 2: The asserted claims are also invalid because they fail to particularly point out and distinctly claim the subject matter that the purported inventors claimed. 2Wire contends that a person of ordinary skill in the art to which the claimed subject matter pertains would not understand the scope of each asserted claim when read in light of the specification. By way of example, and without limitation, at least the following claim terms are indefinite under Section 112:

- "substantially scramble the phase characteristics of the plurality of carrier signals" ('627 Patent, claim 26; '041 Patent, claim 14; '008 Patent, claim 14)
- "multiple carrier signals corresponding to the plurality of phase shifted and scrambled carrier signals are used by the first multicarrier transceiver to demodulate a same input bit value of the received bit stream" ('041 Patent, claim 14)
- "multiple carrier signals corresponding to the scrambled carrier signals are used by a the first multicarrier transceiver to modulate the same bit value" ('008 Patent, claim 14)
- "wherein the value varies with each DMT symbol" ('627 Patent, claim 26)
- "A multicarrier modulation transceiver that uses a transmission signal having a plurality of carrier signals for modulating an input bit stream" ('627 Patent, claim 26)
- "wherein the multicarrier modulation transceiver is capable of associating each

carrier signal with a value determined independently of any input bit value" ('627 Patent, claim 26)

- "transceiver" ('627 Patent, claim 26; '041 Patent, claim 14)
- "a first transceiver that uses a plurality of carrier signals for receiving a bit stream" ('041 Patent, claim 14)
- "the transceiver capable of receiving a bit stream" ('041 Patent, claim 14)
- "a phase shift for each carrier signal is based on . . . the combining of a phase shift for each carrier signal with the phase characteristic of that respective carrier signal" ('041 Patent, claim 14)

The asserted claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to particularly point out and distinctly claim the subject matter that the applicants regard as their invention.

Further, the representative claims are invalid under Section 112 because they purport to claim both an apparatus and a method of using the apparatus. *See IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed. Cir. 2005).

2Wire reserves the right to supplement and/or amend its contentions.

VI. INVALIDITY CONTENTIONS FOR PATENT FAMILY 5

The Court has not yet entered a Claim Construction Order for the Family 5 patents, which may include decisions on the invalidity of the Asserted Family 5 Claims. 2Wire reserves the right to amend its invalidity contentions in response to the Court's Family 5 Claim Construction Order, once it is entered.

A. Invalidity Under 35 U.S.C. § 101

Claims 11 and 16 of the '379 Patent and claims 10 and 16 of the '337 Patent are invalid

for failing to recite patentable subject matter under 35 U.S.C. § 101. Section 101 provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." Mathematical equations generally are not patentable subject matter under § 101. *See, e.g.*, *Bilski v. Kappos*, 561 U.S. 593, 612 (2010) ("The concept of hedging, described in claim 1 and reduced to a mathematical formula in claim 4, is an unpatentable abstract idea, just like the algorithms at issue in *Benson* and *Flook*. Allowing petitioners to patent risk hedging would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea").

Here, TQ Delta concedes that the asserted claims of the Family 5 patents cover nothing more than a mathematical equation. *See* Transcript of *Markman* Hearing, January 10, 2018 at *e.g.*, 51:20-52:2 (Court asks whether the specification "just giv[es] a couple of these equations and that's all you do, is what it thinks normalizing is?" and TQ Delta's counsel responds: "Correct."). Claims 11 and 16 of the '379 Patent are drawn to no more than the abstract idea of identifying CRC errors and normalizing a count of those CRC errors. "CRC" stands for "cyclic redundancy checksum" and was a well-known method of checking for errors in data transmission long before the alleged invention of the Family 5 Patents. Detection of CRC errors, determining a local CRC octet, comparing a local CRC octet to a received octet, and identifying when the local CRC is not identical to the received octet are long-standing, well-known engineering practices. The normalization of errors and error reporting is a long-standing, well-known mathematical practice. Claim 16 simply specifies a mathematical equation (PERp/K), for doing so. Neither claim 11 nor claim 16 requires that the claimed "module" do anything with the normalized error count. For example, the asserted claims do not require reporting the normalized

error count, nor do they require taking any action based on the normalized error count. Moreover, claims 11 and 16 are untethered to any specific implementation or environment because the patentee did not limit the claimed "Cyclic Redundancy Checksum (CRC) anomaly counter normalization module," "CRC bit computation module," "CRC bit comparison module," or "CRC error reporting module" in any way. The patent itself states that these elements can be implemented in hardware, software, or any combination of the two. *See, e.g.*, '379 Patent, col. 9:49-10:27.

Claims 10 and 16 of the '337 Patent are likewise drawn to no more than the abstract idea of normalizing a CRC anomaly counter and reporting when a certain number of anomalies is reached in a certain period of time. Detecting and counting CRC errors, and normalizing them based on a computation period were long-standing, well-known mathematical and engineering practices. Claim 16 merely specifies a mathematical equation (PERp/K). Neither claim 10 nor claim 16 requires that the claimed "transceiver" do anything with the normalized error count. For example, the asserted claims do not require reporting the normalized error count, nor do they require taking any action based on the normalized error count. Claims 10 and 16 of the '337 Patent are also untethered to any specific implementation or environment, and neither the claims, nor the specification place limits on the structure or function of a "transceiver," or of a "CRC anomaly counter" in any way.

In addition, claims 11 and 16 of the '379 Patent and claims 10 and 16 of the '337 Patent risk preempting all ways of calculating, reporting, and normalizing CRC errors.

B. Invalidity Under 35 U.S.C. § 102 and/or 35 U.S.C. § 103

2Wire contends that claim 16 of the '379 Patent and/or claims 10 and 16 of the '337 Patent are anticipated and/or rendered obvious by at least the following references:

- U.S. Patent No. 6,094,465 ("Stein")

- U.S. Patent No. 6,598,189 ("Zhao")
- U.S. Patent No. 7,010,001 ("Odenwalder")
- U.S. Patent No. 7,487,430 ("Kim")
- Seyhan Civanlar & Bharat T. Doshi, "Self-Healing in Wideband Packet Networks," IEEE Network Magazine, January 1990 ("Civanlar")
- U.S. Patent App. Pub. No. 2003/0185212 ("Kelly")
- ITU-T Recommendation G.997.1, "Physical Layer Management for Digital Subscriber Line (DSL) Transceivers" ("G.997.1")
- ITU-T Recommendation G.997.1 (06/1999), "Physical Layer Management for Digital Subscriber Line (DSL) Transceivers" ("G.997.1-1999")
- ITU-T Recommendation G.992.3 (07/2002) "Asymmetric digital subscriber line transceivers 2 (ADSL2)" ("G.992.3-2002")
- ITU-T SG 15/Q4 Contribution, COM 15-D1185-E, "VDSL2: Proposal on VDSL2 Framing" by Thyagarajan Umashankar ("D1185")
- "Network Management Standards: Approaches by T1M1 and the LEC Perspective" by R. Pyle ("Pyle")
- IEEE T1E1.4 Working Group Document T1E1.4/98-024, "Liaison regarding performance monitoring requirements for DSL," January 15, 1998
- IEEE T1E1 Working Group Document T1E1.4/98-180, "Liaison to T1E1.4 on ADSL Performance Parameters," May 22, 1998

The patents, publications, and references identified above qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g). The charts identified as Exhibits K-1 through K-9 and L-1 through L-6 demonstrate how TQ Delta's Asserted Claims of the '379 Patent and '337 Patent are anticipated and/or rendered obvious by the references above. Each chart identifies certain prior art to the '379 Patent and '337 Patent and identifies at least one citation in the prior art reference where each claim element of the asserted claims is disclosed. Though the charts provide illustrative citations to where each claim element may be found in the prior art, the cited references may contain additional disclosures of each claim element as well, and 2Wire

reserves the right to assert that any claim element is disclosed in other portions of the cited references. In addition, 2Wire identifies, and incorporates here by reference, all prior art of record in the prosecution history of the '379 Patent and '337 Patent (and all related patents and applications), and all prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports, or specifications), any of which may anticipate and/or render TQ Delta's Asserted Family 5 Claims obvious. Further, 2Wire identifies any TQ Delta patents that claim the same priority date as the '379 Patent and the '337 Patent and disclose the same subject matter and for which a terminal disclaimer was not filed during prosecution, under the doctrine of obviousness-type double patenting. This includes, but is not limited to, U.S. Patent No. 7,979,778. Additional evidence regarding the features and elements of prior art references may be provided by witness testimony, or by additional documents and materials describing the prior art, that may be identified through the course of ongoing discovery and investigation.

To the extent that a reference above is found to be missing a limitation of TQ Delta's Asserted Family 5 Claims, any one of the prior art references identified above may be combined with any one or more of the following references, all of which qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g), to render the claims obvious under 35 U.S.C. § 103:

- U.S. Patent No. 7,979,778 ("Tzannes")
- U.S. Patent No. 5,936,972 ("Meidan")
- U.S. Patent No. 6,934,885 ("Gabele")
- U.S. Patent No. 5,220,567 ("Dooley")
- U.S. Patent No. 7,032,157 ("Kim '157")
- U.S. Patent No. 7,206, 291 ("Soldani")

- U.S. Patent No. 5,671,255 (“Wang”)
- U.S. Patent No. 5,613,061 (“Taylor”)
- U.S. Patent No. 6,546,509 (“Starr”)
- U.S. Patent No. 5,566,206 (“Butler”)
- U.S. Patent No. 5,751,725 (“Chen”)
- U.S. Patent No. 6,088,337 (“Eastmond”)
- U.S. Patent No. 6,128,763 (“LoGalbo”)
- U.S. Patent No. 6,734,810 (“Kajita”)
- U.S. Patent No. 7,302,379 (“Cioffi”)
- U.S. Patent No. 6,820,232 (“Kim”)
- U.S. Patent No. 6,519,738 (“Derby”)
- U.S. Patent No. 6,065,149 (“Yamanaka”)
- U.S. Patent No. 7,103,822 (“Glaise”)
- U.S. Patent No. 6,175,590 (“Stein”)
- U.S. Patent No. 6,094,465 (“Stein”)
- U.S. Patent No. 6,598,189 (“Zhao”)
- U.S. Patent No. 7,010,001 (“Odenwalder”)
- U.S. Patent No. 7,487,430 (“Kim”)
- U.S. Patent No. 7,451,379 (“Tzannes ’379”)
- U.S. Patent No. 7,925,958 (“Tzannes ’958”)
- U.S. Patent No. 7,979,778 (“Tzannes ’778”)
- U.S. Patent No. 8,516,337 (“Tzannes ’337”)
- U.S. Patent App. Pub. No. 2006/0228113 (“Cutillo”)
- U.S. Patent App. Pub. No. 2004/0198294 (“Hagin-Metzer”)

- U.S. Patent App. Pub. No. 2006/0245366 ("Binde")
- Seyhan Civanlar & Bharat T. Doshi, "Self-Healing in Wideband Packet Networks," IEEE Network Magazine, January 1990 ("Civanlar")
- U.S. Patent App. Pub. No. 2003/0185212 ("Kelly")
- ITU-T Recommendation G.997.1, "Physical Layer Management for Digital Subscriber Line (DSL) Transceivers" ("G.997.1")
- ITU-T SG 15/Q4 Contribution, COM 15-D1185-E, "VDSL2: Proposal on VDSL2 Framing" by Thyagarajan Umashankar ("D1185")
- "Network Management Standards: Aproaches by T1M1 and the LEC Perspective" by R. Pyle ("Pyle")
- Peterson, W.W. and D.T. Brown, "Cyclic Codes for Error Detection," Proceedings of the IRE, January 1961 ("Peterson")
- Huffman, W. Cary and V. Pless, "Fundamentals of Error Correcting Codes," Cambridege University Press, 2003.
- Koopman, "32-Bit Cyclic Redundancy Codes for Internet Applications," The International Conference on Dependable Systems and Networks, 2002.
- Castagnoli et al., "Optimization of Cyclic Redundancy-Check Codes with 24 and 32 Parity Bits," IEEE Transactions on Communications, Vol. 41, No. 6, June 1993.
- Koopman, P. and T. Charkravarty, "Cyclic Redundanct Code (CRC) Polynomial Selection for Embedded Networks," The International Conference on Dependable Systems and Networks, 2004.
- IETF Network Working Group, Request for Comment 3276, "Definitions of Managed Objects for High Bit-Rate DSL – 2nd Generation (HDSL2) and Single-Pair High-Speed Digital Subscriber Line (SHDSL) Lines," May 2002
- ITU-T Recommendation G.826 entitled "End-to-End Error Performance Parameters and Objectives for International, Constant Bit-Rate Digital Paths and Connections" ("G.826")
- ITU SG 15 – Temporary Document SI-064 – Aware, Inc. – "ADSL: CRC Counter Normalization Procedure for SRA and DRR" ("SI-064")
- ITU SG 15 – Temporary Document LBU19R1 – Editor of recommendation G.997.1 – "G.ploam.bis Issues List ("LB-U19R1")

- IEEE T1E1.4 Working Group Document T1E1.4/98-024, "Liaison regarding performance monitoring requirements for DSL," January 15, 1998
- IEEE T1E1 Working Group Document T1E1.4/98-180, "Liaison to T1E1.4 on ADSL Performance Parameters," May 22, 1998
- Applicants' admitted prior art as described in the specification and related application

Specific combinations that render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103 using these references are set forth in Exhibits K-1 through K-9 and L-1 through L-6. Defendant reserves the right to rely on the references listed above for motivation to combine, the state of the art and/or the background knowledge of one of ordinary skill in the art.

In addition, any of the foregoing anticipatory or secondary prior art references listed above may be combined with any of the prior art of record in the prosecution history of the '379 Patent and '337 Patent (and all related patents and applications), or with any prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports or specifications), to render TQ Delta's Asserted Family 5 Claims obvious. Further, any of the foregoing anticipatory or secondary prior art listed above may be combined with one another to render TQ Delta's Asserted Family 5 Claims obvious.

Moreover, one of ordinary skill in the art would have been motivated to combine one or more of the prior art references identified above to arrive at the combination of elements recited in each of TQ Delta's Asserted Family 5 Claims. The suggestion or motivation to modify or combine references for obviousness purposes is provided by the explicit and implicit teachings of the prior art identified by 2Wire, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved. As an initial matter, 2Wire notes that each prior art reference is in or relates to the same field, high-speed telecommunications and DSL systems. In addition, it would have been obvious to try combining

the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. The combination of prior art references identified in these contentions would have been obvious because the combinations represent the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. For example, error correction and monitoring based on cyclic redundancy check codes were known long before the priority date of the Family 5 Asserted Patents, and were commonly in use in telecommunications, including DSL systems. In addition, the ability of DSL systems to carry data at different rates was long known to those of ordinary skill in the art. It would have been a simple step to adjust the manner and scale in which CRC errors are reported.

Also, market forces in the industry and the desire to improve features and performance would motivate the addition of features to systems as they become available, become smaller, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results. The motivation to combine references is exemplary only, and should not be used to limit these disclosures. There would have been substantial motivation to combine the prior art references prior to the invention date, and 2Wire reserves the right to and intends to supplement the foregoing with expert and other testimony. More detailed bases for the motivation to combine specific references will be set forth in 2Wire's invalidity charts and expert report(s) on invalidity following claim construction

and discovery on validity issues.

There are no secondary considerations of non-obviousness pertinent to the obviousness of the subject matter of the asserted claims. To the extent that TQ Delta raises any secondary considerations of non-obviousness, for example, in its expert reports, 2Wire reserves the right to address any such considerations, including by taking discovery on those issues and supplementing and/or amending its invalidity contentions as well as through 2Wire's expert report(s).

In addition, the Asserted Family 5 Claims are invalid under the printed matter doctrine because certain limitations claim printed matter (i.e., content of information) that is not functionally or structurally related to the medium containing the printed matter. In the alternative, the Asserted Family 5 Claims are invalid under the printed matter doctrine because certain limitations claim printed matter and are not entitled to patentable weight, without which the claims are anticipated or rendered obvious by the cited references. By way of example and not of limitation, printed matter includes limitations directed to the value by which a CRC anomaly counter is incremented "of M, wherein the value of M is equal to PERp/K, and K is a positive integer," and "wherein K is equal to 20 or 15."

2Wire does not presently have any disclosures under 35 U.S.C. § 102(f). However, 2Wire reserves the right to amend and supplement these § 102(f) contentions as further information and discovery are obtained including, in particular, with regard to the alleged conception and reduction-to-practice of the patents-in-suit.

C. Invalidity Under 35 U.S.C. § 112

2Wire lists below grounds upon which TQ Delta's Asserted Family 5 Claims are invalid for failure to meet one or more requirements of 35 U.S.C. ¶ 112. A more detailed basis for 2Wire's written description, enablement, and indefiniteness defenses will be set forth in 2Wire's

expert report(s) on invalidity. Furthermore, discovery regarding invalidity (e.g., inventor depositions, etc.) is ongoing. 2Wire reserves the right to supplement and/or amend these contentions based on Section 112. Such supplementation and/or amendments may include, but are not limited to, invalidity contentions based on a failure to disclose the best mode of practicing the alleged invention and/or invalidity contentions based on indefiniteness, lack of written description, and/or lack of enablement should the claims be construed under 35 U.S.C. § 112 ¶ 6.

Invalidity Under 35 U.S.C. § 112 ¶ 1: TQ Delta's Asserted Family 5 Claims are invalid because the patent specification lacks sufficient description of the subject matter claimed, and the manner and process of using it, in such full, clear, concise, and exact terms as to enable any person of ordinary skill in the art to which it pertains to make and use the claimed subject matter without undue experimentation. In addition, the full scope of each claim was not described with particularity in the specification to which priority is apparently sought, thereby setting forth insufficient detail to allow one of ordinary skill in the art to understand what is claimed and to recognize that the inventor(s) invented what is claimed. By way of example, and without limitation, at least the following elements are not enabled and/or fail to meet the written description requirement of Section 112:

- "A Cyclic Redundancy Checksum (CRC) anomaly counter normalization module designed to normalize a CRC anomaly counter based on a value for a CRC computation period (PERp)" ('379 Patent, claims 11 and 16)
- "a CRC bit computation module designed to determine a local octet based on a received bit stream" ('379 Patent, claims 11 and 16)
- "a CRC bit comparison module designed to compare the local CRC octet to a

received CRC octet" ('379 Patent, claims 11 and 16)

- "a CRC error reporting module designed to identify a CRC anomaly when the local CRC octet is not identical to the received CRC octet" ('379 Patent, claims 11 and 16)
- "normalizing of the CRC anomaly counter" ('379 Patent, claims 11 and 16)
- "a transceiver operable to normalize a CRC anomaly counter" ('337 Patent, claims 10 and 16)
- "when there are more than N CRC anomalies in a period of time" ('337 Patent, claims 10 and 16)

TQ Delta's Asserted Family 5 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to meet the enablement and/or written description requirements of Section 112.

2Wire's accused products do not infringe TQ Delta's Asserted Family 5 Claims for at least the reasons set out in the non-infringement charts previously provided by 2Wire, and any supplements thereto. To the extent TQ Delta's Asserted Family 5 Claims may eventually be construed so broadly as to cover the accused products, such a construction would render TQ Delta's Asserted Family 5 Claims invalid for failure to meet the requirements of Section 112, paragraph 1.

Invalidity Under 35 U.S.C. § 112 ¶ 2: TQ Delta's Asserted Family 5 Claims are also invalid because they fail to particularly point out and distinctly claim the subject matter that the purported inventors claimed. 2Wire contends that a person of ordinary skill in the art to which the purported invention pertains would not understand the scope of each asserted claim when read in light of the specification. By way of example, and without limitation, at least the

following claim terms are indefinite under Section 112:

- "A Cyclic Redundancy Checksum (CRC) anomaly counter normalization module designed to normalize a CRC anomaly counter based on a value for a CRC computation period (PERp)" ('379 Patent, claims 11 and 16)
- "a CRC bit computation module designed to determine a local octet based on a received bit stream" ('379 Patent, claims 11 and 16)
- "a CRC bit comparison module designed to compare the local CRC octet to a received CRC octet" ('379 Patent, claims 11 and 16)
- "a CRC error reporting module designed to identify a CRC anomaly when the local CRC octet is not identical to the received CRC octet" ('379 Patent, claims 11 and 16)
- "normalizing of the CRC anomaly counter" ('379 Patent, claims 11 and 16)
- "a transceiver operable to normalize a CRC anomaly counter" ('337 Patent, claims 10 and 16)
- "when there are more than N CRC anomalies in a period of time" ('337 Patent, claims 10 and 16)

TQ Delta's Asserted Family 5 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to particularly point out and distinctly claim the subject matter that the applicants regard as their invention.

Further, TQ Delta's Asserted Family 5 Claims are invalid under Section 112 because they purport to claim both an apparatus and a method of using the apparatus. To the extent that TQ Delta's Asserted Family 5 Claims invoke 35 U.S.C. § 112, ¶ 6 (pre-AIA), those claims are

invalid for failing to recite sufficient structure to perform the recited function. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339 (Fed. Cir. Jun. 16, 2015) (en banc). For example, the specification does not recite corresponding structure for the "Cyclic Redundancy Checksum (CRC) anomaly counter normalization module," "CRC bit computation module," "CRC bit comparison module," or "CRC error reporting module" recited in claims 11 and 16 of the '379 Patent.

The Federal Circuit explained in *Williamson* that when determining whether a claim is subject to Section 112, ¶ 6, the "essential inquiry is not merely the presence or absence of the word 'means' but whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure." *Id*. at 1348. Section 112, ¶ 6 applies to a claim term that does not use the word "means" when "the claim term fails to 'recite sufficiently definite structure' or else recites 'function without reciting sufficient structure for performing that function.'" *Id*. at 1349 (citation omitted). The disclosure requirement applies even where a skilled artisan might be able to devise a structure to perform the claimed function. *See Blackboard, Inc. v. Desire2Learn, Inc*., 574 F.3d 1371, 1385 (Fed. Cir. 2009) ("A patentee cannot avoid providing specificity as to structure simply because someone of ordinary skill in the art would be able to devise a means to perform the claimed function."). A claim can meet the paragraph 1 enablement requirement of section 112 but still fail under paragraph 6. *See, e.g.*, *Atmel Corp. v. Information Storage Devices, Inc*., 198 F. 3d 1374, 1382 (Fed. Cir. 1999) ("Section 112, ¶ 6, however, does not have the expansive purpose of ¶ 1. It sets forth a simple requirement, a quid pro quo, in order to utilize a generic means expression. All one needs to do in order to obtain the benefit of that claiming device is to recite some structure corresponding to the means in the specification, as the statute states, so that one can readily ascertain what the

claim means and comply with the particularity requirement of ¶ 2.") (emphasis added). But "[f]ulfillment of the § 112, ¶ 6 tradeoff cannot be satisfied when there is a total omission of structure. There must be structure in the specification." *Id*.

The Federal Circuit also recognized in *Williamson* that the term "module" is a "well-known nonce word that can operate as a substitute for 'means' in the context of § 112, para. 6." *Williamson*, 792 F.3d at 1350 ("It replaces the term 'means' with the term 'module' and recites three functions performed by the 'learning control module.'"). "[T]he term 'module' does not provide any indication of structure because it sets forth the same black box recitation of structure for providing the same specified function as if the term 'means' had been used." *Id*.

Here, each of the "module" terms are described in the claims as being "designed to" perform *functions* relating to determining, comparing, identifying, computing, and normalizing. Notably, the patentee specifically defined the term "module" even more broadly than the "generic description" that the Federal Circuit found invoked Section 112, ¶ 6 in *Williamson*: "The term module as used herein can refer to *any known or later developed hardware, software, firmware, or combination thereof that is capable of performing the functionality associated with that element*." '379 Patent at 4:19-22 (emphasis added). By that definition, the patentee expansively defined the term "module" as used in its claims expressly to be without any specific structure at all. That each "module" is part of a transceiver does not remedy this express disclaimer of any sufficiently definite structure in the specification, nor does the file history of the Family 5 patents fill in the gap. The "[adjective] module [performing a function]" grammatical structure tracks the classic "means for [performing a function]" language and renders the term subject to Section 112, ¶ 6. Moreover, none of the verbiage (e.g., "CRC bit computation") surrounding the "module" terms had common or generally understood meanings

at the time of the alleged invention. No corresponding structures are identified in the specification. Indeed, the figures depict black boxes covering any means for achieving the claimed functions. *See, e.g.*, '379 patent at 3:27-28 ("FIG. 1 is a *functional block diagram* illustrating an exemplary communication system according to this invention") (emphasis added). Moreover, to the extent that the claimed functions are accomplished merely using software, no specific algorithm is disclosed to perform the claimed function. Thus, claims 11 and 16 of the '379 patent are subject to the requirements of 35 U.S.C. § 112, ¶ 6, and invalid for failure to satisfy those requirements. 2Wire hereby incorporates by reference Defendants' sections of the Parties' Joint Claim Construction Brief for Family 5 Patents (D.I. 374), and any declarations in support, as if fully set forth herein.

To the extent that claims 11 and 16 of the '379 patent do not invoke 35 U.S.C. § 112, ¶ 6 (pre-AIA), those claims are invalid for merely claiming the function of an apparatus.

VII. INVALIDITY CONTENTIONS FOR PATENT FAMILY 6

A. Invalidity Under 35 U.S.C. § 101.

Claims 8 and 10 of the '835 Patent are invalid for failing to recite patentable subject matter under 35 U.S.C. § 101. Section 101 provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." Nonetheless, there are three recognized exceptions to Section 101: "laws of nature, physical phenomena, and abstract ideas." *Bilski v. Kappos*, 561 U.S. 593, 601 (2010) (*quoting Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)).

TQ Delta's Asserted Family 6 Claims of the '835 Patent are invalid for claiming no more than an abstract idea. In *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014), the Supreme Court set out a two-part test for determining whether a claim recites patent-eligible subject

matter. First, the court must determine whether the claims at issue are directed toward laws of nature, natural phenomena, or abstract ideas. *Id.* at 2355. Second, if the claims are directed toward ineligible subject matter, the court must then consider the claim elements – both individually and as an ordered combination – to determine whether they add an "inventive concept." *Id.* Merely claiming a generic "computer" to implement an abstract idea is not sufficient to transform the computer into a patent-eligible invention. *Id.* at 2357-50.

Here, claims 8 and 10 of the '835 Patent are drawn to no more than the abstract idea of adjusting transmission settings from one value to another. Transmission using forward error correction and interleaver parameters is a long-standing, well-known engineering practice in the field of communication. The adjustment of the settings for those transmission techniques is similarly long standing and well-known. The claims are untethered to any specific implementation or environment. Nor do the elements of the claims – whether individually or as a whole – evidence any "inventive concept." Transmitting a signal using a forward error correction and interleaver setting and transmitting a flag signal were well-known as was the notion of changing the forward error correction and interleaver parameter setting on a codeword boundary. The claims recite only a conventional technological environment, such as a conventional transceiver, and conventional methods of communicating information, that were well-known at the time of the alleged invention. Moreover, the '835 Patent claims do not require the transceiver to do anything other than to send a signal in two settings and sending a flag signal to flag the switching of the setting. For example, the '835 Patent claims do not require processing the message, interpreting the information in the message, or taking any action based on the information in the message. Accordingly, claims 8 and 10 of the '835 Patent are invalid for failure to recite patentable subject matter.

B. Invalidity Under 35 U.S.C. § 102 and/or 35 U.S.C. § 103

2Wire contends that claims 8 and 10 of the '835 Patent are anticipated and/or rendered obvious by at least the following references:

- U.S. Patent No. 5,699,365 ("Klayman")
- U.S. Patent Application with Publication No. 2002/0080867 ("Abbas")
- U.S. Patent No. 7,428,669 ("Cioffi")
- ITU-T Recommendation G.992.3 (07/2002)
- U.S. Patent Application with Publication No. 2003/0174764 ("Mahany")
- U.S. Patent No. 6,700,881 ("Kong")
- ITU-T Recommendation G.992.1 (06/1999)
- ITU-T Study Group 15, Question 4 Contribution SC-060 ("SC-060")

The patents, publications, and references identified above qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g). The charts identified as Exhibits M-1 through M-8 demonstrate how TQ Delta's Asserted Family 6 Claims of the '835 Patent are anticipated and/or rendered obvious by the references above. Each chart identifies certain prior art to the '835 Patent and identifies at least one citation in the prior art reference where each claim element of the asserted claims is disclosed. Though the charts provide illustrative citations to where each claim element may be found in the prior art, the cited references may contain additional disclosures of each claim element as well, and 2Wire reserves the right assert that any claim element is disclosed in other portions of the cited references. In addition, 2Wire identifies, and incorporates here by reference, all prior art of record in the prosecution history of the '835 Patent (and all related patents and applications), and all prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports, or specifications), any of which may anticipate and/or render TQ Delta's Asserted

Family 6 Claims obvious. Additional evidence regarding the features and elements of prior art references may be provided by witness testimony, or by additional documents and materials describing the prior art, that may be identified through the course of ongoing discovery and investigation.

To the extent that a reference above is found to be missing a limitation of TQ Delta's Asserted Family 6 Claims, any one of the prior art references identified above may be combined with any one or more of the following references, all of which qualify as prior art under 35 U.S.C. §§ 102(a), 102(b), 102(e), and/or 102(g), to render TQ Delta's Asserted Family 6 Claims obvious under 35 U.S.C. § 103:

- U.S. Patent No. 7,940,798 ("Puputti")
- U.S. Patent No. 6,182,264 ("Ott")
- U.S. Patent No. 7,706,287 ("Tanaka")
- U.S. Patent No. 7,343,543 ("Mantha")
- U.S. Patent No. 7,418,240 ("Hsu")
- U.S. Patent No. 7,372,901 ("Holcomb")
- U.S. Patent No. 7,257,764 ("Suzuki")
- U.S. Patent No. 7,197,067 ("Lusky")
- U.S. Patent No. 7,181,177 ("Pauli")
- U.S. Patent No. 7,170,432 ("Ettorre")
- U.S. Patent No. 7,024,596 ("Xin")
- U.S. Patent No. 6,983,414 ("Duschatko")
- U.S. Patent No. 6,982,964 ("Beering")
- U.S. Patent No. 6,928,603 ("Castagna")
- U.S. Patent No. 6,772,388 ("Cooper")

- U.S. Patent No. 6,732,323 (“Mitlin”)
- U.S. Patent No. 6,477,669 (“Agarwal”)
- U.S. Patent No. 6,266,348 (“Gross”)
- U.S. Patent No. 6,067,646 (“Starr”)
- U.S. Patent No. 5,907,563 (“Takeuchi”)
- U.S. Patent No. 5,828,677 (“Sayeed”)
- U.S. Patent No. 5,638,384 (“Hayashi”)
- U.S. Patent No. 5,546,411 (“Leitch”)
- U.S. Patent No. 5,436,917 (“Karasawa”)
- U.S. Patent No. 5,392,299 (“Rhines”)
- U.S. Patent No. 4,677,622 (“Okamoto”)
- U.S. Patent No. 4,644,544 (“Furaya”)
- U.S. Patent No. 4,541,091 (“Nishida”)
- U.S. Patent No. 4,716,567 (“Ito”)
- U.S. Patent No. 5,699,365 (“Klayman”)
- U.S. Patent Application with Publication No. 2002/0080867 (“Abbas”)
- U.S. Patent No. 7,428,669 (“Cioffi”)
- ITU-T Recommendation G.992.3 (07/2002)
- U.S. Patent Application with Publication No. 2003/0174764 (“Mahany”)
- U.S. Patent No. 6,700,881 (“Kong”)
- ITU-T Recommendation G.992.1 (06/1999)
- ITU-T Study Group 15, Question 4 Contribution SC-060 (“SC-060”)
- U.S. Patent Application with Publication No. 2007/0258487 (“Puputti”)
- U.S. Patent Application with Publication No. 2003/30193889 (“Jacobsen”)

- U.S. Patent Application with Publication No. 2002/0041570 ("Ptasinski")
- U.S. Patent Application with Publication No. 2001/0022810 ("Joo")
- EP0696108A1
- EP0923821B1
- "HomePlug 1.0 Powerline Communication LANs – Protocol Description and Performance Results version 5.4," International Journal of Communication Systems ("Lee")
- "Improving I/O Performance of Multimedia Servers," University of Oslo, Norway ("Halvorsen")
- "Turbo Coded OFDM System for Video Terrestrial Broadcasting," LTS3-ITS-STI EPFL Ecublens, 1015, Switzerland ("Lattuada")

Specific combinations that render TQ Delta's Asserted Claims obvious under 35 U.S.C. § 103 using these references are set forth in Exhibits M-1 through M-8. Defendant reserves the right to rely on the references listed above for motivation to combine, the state of the art and/or the background knowledge of one of ordinary skill in the art.

In addition, any of the foregoing anticipatory or secondary prior art references listed above may be combined with any of the prior art of record in the prosecution history of the '835 Patent (and all related patents and applications), or with any prior art ITU-T Recommendations or other industry publications (such as ATM Forum, Broadband Forum, or similar groups' publications, reports or specifications), to render TQ Delta's Asserted Family 6 Claims obvious. Further, any of the foregoing anticipatory or secondary prior art references listed above may be combined with one another to render TQ Delta's Asserted Family 6 Claims obvious.

Moreover, one of ordinary skill in the art would have been motivated to combine one or more of the prior art references identified above to arrive at the combination of elements recited in each of TQ Delta's Asserted Family 6 Claims. The suggestion or motivation to modify or combine references for obviousness purposes is provided by the explicit and implicit teachings

of the prior art identified by 2Wire, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved. As an initial matter, 2Wire notes that each prior art reference is in or relates to the same field, high-speed data communications and DSL systems. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. For example, flag signals were known by those of ordinary skill in the art, and would have been one of a finite number of predictable ways to signal a change in transmission parameters in a DSL system during transmission. The combination of prior art references identified in these contentions would have been obvious because the combinations represent the known potential options with a reasonable expectation of success.

Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry and the desire to improve features and performance would motivate the addition of features to systems as they become available, become smaller, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results. One of ordinary skill in the art would have recognized that it would be desirable to be able to change transmission parameters during transmission in response to, for example, a change in data rate, without going through a modem retraining. Those in the industry, and those of

ordinary skill in the art would understand that such features may lead to more reliable, high-quality service for customers. The motivation to combine references is exemplary only, and should not be used to limit these disclosures. There would have been substantial motivation to combine the prior art references prior to the invention date, and 2Wire reserves the right to and intends to supplement the foregoing with expert and other testimony. More detailed bases for the motivation to combine specific references will be set forth in 2Wire's expert report(s) on invalidity.

To the extent that TQ Delta raises any secondary considerations of non-obviousness, for example, in its expert reports, 2Wire reserves the right to address any such considerations, including by taking discovery on those issues and supplementing and/or amending its invalidity contentions.

2Wire does not presently have any disclosures under 35 U.S.C. § 102(f). 2Wire reserves the right to amend and supplement these § 102(f) contentions as further information and discovery are obtained including, in particular, with regard to the alleged conception and reduction-to-practice of the patents-in-suit.

C. Invalidity Under 35 U.S.C. § 112

2Wire lists below grounds upon which TQ Delta's Asserted Family 6 Claims are invalid for failure to meet one or more requirements of 35 U.S.C. ¶ 112. A more detailed basis for 2Wire's written description, enablement, and indefiniteness defenses will be set forth in 2Wire's expert report(s) on invalidity. 2Wire reserves the right to supplement and/or amend these contentions based on Section 112. Such supplementation and/or amendments may include, but are not limited to, invalidity contentions based on indefiniteness, lack of written description, and/or lack of enablement.

Invalidity Under 35 U.S.C. § 112 ¶ 1: TQ Delta's Asserted Family 6 Claims are invalid

because the patent specification lacks sufficient description of the subject matter claimed, and the manner and process of using it, in such full, clear, concise, and exact terms as to enable any person of ordinary skill in the art to which it pertains to make and use the claimed subject matter without undue experimentation. In addition, the full scope of each claim was not described with particularity in the specification to which priority is apparently sought, thereby setting forth insufficient detail to allow one of ordinary skill in the art to understand what is claimed and to recognize that the inventor(s) invented what is claimed. By way of example, and without limitation, at least the following elements are not enabled and/or fail to meet the written description requirement of Section 112:

- "the switching occurs on a pre-defined forward error correction codeword boundary following the flag signal" ('835 Patent, claims 8 and 10)
- "interleaver parameter value" ('835 Patent, claims 8 and 10)
- "FIP [setting/value]" ('835 Patent, claims 8 and 10)

TQ Delta's Asserted Family 6 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to meet the enablement and/or written description requirements of Section 112.

2Wire's accused products do not infringe TQ Delta's Asserted Family 6 Claims for at least the reasons set out in the non-infringement charts previously provided by 2Wire, 2Wire's interrogatory responses, and any supplements thereto. To the extent that TQ Delta's Asserted Family 6 Claims may eventually be construed so broadly as to cover the accused products, such a construction would render TQ Delta's Asserted Family 6 Claims invalid for failure to meet the requirements of Section 112, paragraph 1.

Invalidity Under 35 U.S.C. § 112 ¶ 2: TQ Delta's Asserted Family 6 Claims are also

invalid because they fail to particularly point out and distinctly claim the subject matter that the purported inventors claimed. 2Wire contends that a person of ordinary skill in the art to which the purported invention pertains would not understand the scope of each claim when read in light of the specification. By way of example, and without limitation, at least the following claim terms are indefinite under Section 112:

- "configurable to" ('835 Patent, claims 8 and 10)
- "pre-defined forward error correction boundary" ('835 Patent, claims 8 and 10)

TQ Delta's Asserted Family 6 Claims (and all other claims in the asserted patents that include or depend from any claims that include any of the above limitations) are invalid because they fail to particularly point out and distinctly claim the subject matter that the applicants regard as their invention. Moreover, TQ Delta repeatedly altered its position as to the potential meaning of "pre-defined forward error correction boundary," indicating that the scope and meaning of the limitation is indefinite.

Further, TQ Delta's Asserted Family 6 Claims are invalid under Section 112 because they purport to claim both an apparatus and a method of using the apparatus. *See IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed. Cir. 2005). For example, claim 8 of the '835 Patent recites an apparatus, then recites steps performed by the apparatus, such as "transmit signal using a first FIP setting," "transmit a flag signal," and "switch to using for transmission, a second FIP setting following transmission of the flag signal." Moreover, to the extent that the claimed functions are accomplished merely using software, no specific algorithm is disclosed to perform the claimed function. And to the extent that TQ Delta's Asserted Family 6 Claims do not invoke 35 U.S.C. § 112, ¶ 6 (pre-AIA), those claims are invalid for merely claiming the function of an apparatus. Thus, Asserted Family 6 Claim is invalid as indefinite under Section

112, paragraph 2.

August 15, 2018

By: /s/ Jody C. Barillare

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CERTIFICATE OF SERVICE

I, Jody C. Barillare, hereby certify that on August 15, 2018, a copy of DEFENDANT 2WIRE, INC.'S INVALIDITY CONTENTIONS IN RESPONSE TO TQ DELTA'S JULY 2, 2018 FINAL INFRINGEMENT CONTENTIONS was served on the following as indicated:

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